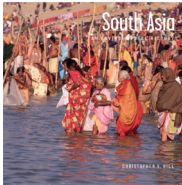


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CHRISTOPHER K. HILL

SOUTH ASIA

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SOUTH ASIA

An Environmental History

Christopher V. Hill

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A B C  C L I O

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Manufactured in the United States of America

For
Walter Hauser
My friend and mentor

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CONTENTS

	<i>Series Foreword</i>	<i>xi</i>
	<i>Acknowledgments</i>	<i>xv</i>
	<i>Introduction</i>	<i>xvii</i>
1	THE ENVIRONMENTAL SETTING	1
	Physical Characteristics	1
	Climate	4
	Plant and Animal Life	5
	Cultural Geography	8
	Early Human Activity	11
2	THE INDUS CIVILIZATION AND THE ARYAN IMPACT	15
	The Indus Civilization	15
	South India	18
	The Aryan Migration	20
	The Vedic Religion	21
	Aryan Society	24
3	THE MAURYAN EMPIRE AND THE CLASSICAL AGE	27
	Buddhism and Jainism	27
	The Mauryan Empire	28
	Ashoka and Ecology	29
	Irrigation in Early India	32
	The Classical Period	35
	Hinduism	36
	The Decline of the Classical Period	42
4	IMPERIAL INTERLUDE	43
	South India	44
	Agrarian Practices in South India	45

	Peasant Options in Hydraulic South India	46
	Vijayanagar	49
	Islam	52
	Islam and Ecology	54
	The Advent of Islam	55
	The Delhi Sultanate	56
	Environmental Change in Medieval India	59
	The Transition from Medieval to Early Modern	61
5	THE RISE AND FALL OF THE MUGHAL EMPIRE	63
	Akbar	66
	Sikhism	69
	The Later Mughal Emperors	71
	The Decline of the Mughal Empire	74
	The British East India Company	76
	Conclusion	82
6	COMPANY RULE	83
	Utilitarianism	84
	Difference	88
	Scientific Validation	91
	Validation, Ideology, and Environmental History, 1793–1857	93
	Land	93
	Trade	97
	Public Works	100
	Disease	102
	Education	105
	The 1857 Rebellion	107
7	IMPERIUM, 1858–1947	111
	The New Policy	114
	Education	117
	Railways	121
	Forests	125
	Public Works	128
	Health	133
	Famine	136
	Conclusion	140

8	SRI LANKA AND NEPAL IN THE MODERN ERA	141
	Sri Lanka	141
	Nepal	150
	The Terai	152
	The Hill Region	155
	The Mountain Region	158
	Conclusion	160
9	INDEPENDENCE AND PARTITION	163
	World War I and the Emergence of Gandhi	164
	Gandhi and the Environment	165
	The Environmental Consequences of Partition	172
	Partition and the Indus River System	175
	The Partition of Bengal	178
	Environmental Impact on Bangladesh	179
	Conclusion	180
10	SOUTH ASIA SINCE 1947	183
	Public Works, Industry, and Commodification	187
	Grassroots Environmental Movements: The Example of Chipko	196
	Natural Disasters in Independent South Asia	198
	Conclusion	203
11	CONCLUSION	205
12	CASE STUDIES	211
	Case Study A: The Agrarian System of Mughal India	211
	The Decline of the Mughal Agrarian System	218
	Conclusion	221
	Case Study B: The Permanent Settlement Act and the Kosi River	221
	The Kosi River	225
	The Permanent Settlement in Action	227
	The Peasant and Riparian Cultivation	228
	The Santals and the Kosi Jungles	231
	Conclusion	232

Case Study C: Narmada Bachao Andolan (Save the Narmada
Movement) 234

 The Narmada Bachao Andolan 239

 Conclusion 247

Important People, Events, and Concepts 249

Chronology 271

Bibliographic Essay 279

Bibliography 293

Glossary 307

Index 313

About the Author 329

SERIES FOREWORD

Long ago, only time and the elements shaped the face of the earth, the black abysses of the oceans, and the winds and blue welkin of heaven. As continents floated on the mantle, they collided and threw up mountains or drifted apart and made seas. Volcanoes built mountains out of fiery material from deep within the earth. Mountains and rivers of ice ground and gorged. Winds and waters sculpted and razed. Erosion buffered and salted the seas. The concert of living things created and balanced the gases of the air and moderated the earth's temperature.

The world is very different now. From the moment our ancestors emerged from the southern forests and grasslands to follow the melting glaciers or to cross the seas, all has changed. Today the universal force transforming the earth, the seas, and the air is for the first time a single form of life: we humans. We shape the world, sometimes for our purposes and often by accident. Where forests once towered, fertile fields or barren deserts or crowded cities now lie. Where the sun once warmed the heather, forests now shade the land. We exterminate one creature only to bring another from across the globe to take its place. We pull down mountains and excavate craters and caverns; drain swamps and make lakes; divert, straighten, and stop rivers. From the highest winds to the deepest currents, the world teems with chemical concoctions that only we can brew. Even the very climate warms from our activity.

And as we work our will upon the land, as we grasp the things around us to fashion them into instruments of our survival, our social relations, and our creativity, we find in turn our lives and even our individual and collective destinies shaped and given direction by natural forces, some controlled, some uncontrolled, and some unleashed. What is more, uniquely among the creatures, we come to know and love the places where we live. For us, the world has always abounded with unseen life and manifest meaning. Invisible beings have hidden in springs, in mountains, in groves, in the quiet sky and the thunder of the clouds, in the deep waters. Places of beauty from magnificent mountains to small,

winding brooks have captured our imaginations and our affection. We have perceived a mind like our own, but greater, designing, creating, and guiding the universe around us.

The authors of the books in this series endeavor to tell the remarkable epic of the intertwined fates of humanity and the natural world. It is a story only now coming to be fully known. Although traditional historians have told the drama of men and women of the past, for more than three decades now, many historians have added the natural world as a third actor. Environmental history by that name emerged in the 1970s in the United States. Historians quickly took an interest and created a professional society, the American Society for Environmental History, and a professional journal, now called *Environmental History*. U.S. environmental history flourished and attracted foreign scholars. By 1990 the international dimensions were clear; European scholars joined together to create the European Society for Environmental History in 2001, with its journal, *Environment and History*. A Latin American and Caribbean Society for Environmental History should not be far behind. With an abundant and growing literature of world environmental history now available, a true world environmental history can appear.

This series is organized geographically into regions determined as much as possible by environmental and ecological factors, and secondarily by historical and historiographical boundaries. Befitting the vast environmental historical literature on the United States, four volumes tell the stories of the North, the South, the Plains and Mountain West, and the Pacific Coast. Other volumes trace the environmental histories of Canada and Alaska, Latin America and the Caribbean, Northern Europe, the Mediterranean region, sub-Saharan Africa, South Asia, Southeast Asia, East Asia, and Australia and Oceania. Authors from around the globe, experts in the various regions, have written these volumes, almost all of which are the first to convey the complete environmental history of their subjects. Each author has, as much as possible, written the twin stories of the human influence on the land and of the land's manifold influences on its human occupants. Every volume contains a narrative analysis of a region along with a body of reference material. This series constitutes the most complete environmental history of the globe ever assembled, chronicling the astonishing tragedies and triumphs of the human transformation of the earth.

The process of creating the series, recruiting the authors from around the world, and editing their manuscripts has been an immensely rewarding experience for me. I cannot thank the authors enough for all of their effort in realizing these volumes. I owe a great debt to Kevin Downing, who first approached me about the series, and Steven Danver at ABC-CLIO, who has

shepherded the volumes through delays and crises all the way to publication. Their unfaltering support for and belief in the series were essential to its successful completion.

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Tough as it is, I made a vow that I would ignore any environmental metaphors that came to mind as I began thanking the multitude of people to whom I owe so much for the writing, completion, and production of this volume. Suffice it to say that I have incurred enormous debts over the past several years.

I should begin with the specifics. J. Donald Hughes recommended me for this project, and while at times I was consumed by the thought that his support was misplaced (depending on how far behind deadline I was at the time), I will always be grateful for his confidence in me. My various editors at ABC-CLIO—Betsy Crist, Steve Danver, Alex Mikaberidze, Ellen Rasmussen, Mark Stoll, and Kristine Swift—deserve similar praise for their patience and editorial expertise. My friend and research assistant extraordinaire, Samantha Christiansen, was indispensable to this project, even though she had the nerve to accept a PhD fellowship in Boston before the manuscript was completed. In truth, Sam was a better assistant 2,000 miles away than many I have had who were located on the same campus. A number of the rough spots in the manuscript were smoothed out by a team of superb proofreaders; indeed, the work of Roberta Crownover, Barbara Headle, and Carol E. Hill extended so far beyond locating common errors that “proofreading” is too weak a description of their completely voluntary assistance.

In a research and teaching career spanning a quarter of a century, the University of Colorado at Colorado Springs is the most flexible and accommodating institution I have known; I am enormously fortunate to be part of such a collegial department and campus. For the administrative encouragement I received, I need to thank Dean Tom Christiansen and Associate Dean Rex Welshon of the College of Letters, Arts, and Science, and especially my friend and History Department Chair Robert E. Sackett. Rob juggled my schedule in a way that left me with blocks of free time without compromising my normal academic responsibilities. The devil of administrative assistants, Debbie Scott, provided so much help that it is hard to single out a particular example, although making certain I was not forced to sleep on the benches at the Bhubaneswar train station must be near

the top of the list. Dr. Seyed E. Hasnain, the Vice Chancellor of Hyderabad Central University, with his offer of a UPE Visiting Professorship for the spring semester of 2007, gave me the opportunity to complete much of this writing in a perfect surrounding. However, it is to my dear friend and History Department head at Hyderabad Central University, Professor Atlury Murali, to whom my greatest debt in India belongs. Murali and his colleagues in the History Department made me feel welcome and at ease, and they treated me as a member of the department. My conversations with so many of them, over a cup of tea or a meal of Hyderabad biryani, added depth to parts of this volume that three months in a library could never have provided. The beautiful, 2,300-acre wooded campus, with its wild, multihued parrots, and peacocks strutting in full plumage, was the perfect setting for writing a South Asian environmental history. I shall treasure those times forever.

Throughout this journey, the following friends and colleagues protected my sanity, broadened my knowledge, or did both; I hope they all know how much their support and assistance has meant to me: Daud Ali, Rich Barnett, Peter Brumlik, Rohan D'Souza, Emma Flatt, Andrea Herrera, Ron Inden, Kailash and Abha Jha, Christina Jimenez, Chris Jones and the Liverpool Fab Five (Amy, Rob, Katherine, Jane, and Elaine), Omar Khalidi, David Ludden, Jim and Becky Menlove, Rila Muckerjee, Pashendra Satyal Pravat, Peter Robb, Pushkar Sahoni, Peter Schmitthenner, Thayer Scudder, Deb Ranjan Sinha, Donald Worster, Rick Wunderli, Chandra Shekhar Yadav, Anand Yang, and the indispensable staff of the Ginger Hotel in Bhubaneswar. I'd like to make special mention of a kind and gifted member of our profession, the groundbreaking environmental historian Richard Grove, who is currently recovering from a devastating automobile accident suffered in October 2006.

Finally, as is always the case, my family carried the greatest burden. My father, Ralph Owen Hill, died while I was in India completing this work; my memories of him are intertwined in every chapter. To my wife, Carol, and my sons, Alex and Andrew, my greatest thanks. I owe you everything.

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INTRODUCTION

When I think of India, I think of many things: of broad fields dotted with innumerable small villages; of towns and cities I have visited; of the magic of the rainy season which pours life into the dry, parched-up land and converts it suddenly into a glistening expanse of beauty and greenery; of great rivers and flowing waters; of the Khyber Pass in all its bleak surroundings; of the southern tip of India; of people, individually and in the mass; and, above all, of the Himalayas, snow-capped, or some mountain valley in Kashmir in the spring, covered with new flowers and with a brook bubbling and gurgling through it.

Jawaharlal Nehru, 1949

The great subcontinent of India is all these things that Jawaharlal Nehru, independent India's first prime minister, described and more. It is mountains and valleys and deserts and plains. It is rivers and oceans. It is the tigers and pye-dogs, the elephants and the ubiquitous cows. It is peasants and laborers and an emerging middle class and the few very wealthy. But most of all, it is the intangibles, what the political scientist Sunil Khilnani calls "the Idea of India," that ties the region together (Khilnani 2000). This idea encompasses philosophy, religion, ethics, governance, military strategy, culture, and society. Every one of these aspects, from the physical to the ideological, was affected by and developed in response to the South Asian environment. From the early Indus civilization, named after the river system in which it was located, through invasions from Asia and Europe, to the trifurcation of India and Pakistan in 1947, and finally the human tragedy caused by the tsunami of December 2004 and the Kashmiri earthquake of October 2005, the people of South Asia have influenced and been influenced by their ecological surroundings. Before we immerse ourselves in this relationship, it is important to first explain the meaning and history of environmental history.

ENVIRONMENTAL HISTORY

Simply put, environmental history is the study of the reciprocal relationship of nature and humankind in a particular historical period. This can be studied in

two general ways. One is the more purely scientific approach: How do humans affect the ecology surrounding them? The other emphasizes the human aspect: How does this interaction affect the decisions of and consequent result for humankind, and what are the outcomes for both humanity and the earth? These questions are not mutually exclusive of course. The historian Donald Worster has noted three levels of basic knowledge for environmental historians. The first is a general knowledge of nature itself, to enable practitioners to make sense of the ecological changes they discover. The second is the socioeconomic realm. What are the means of production (e.g., peasants, laborers, factories)? What role does technology play over time, and how do these technological changes affect the environment with which they interact? Finally, environmental historians must have a sense of the intangibles mentioned earlier—perceptions, myths, ideologies, values, and more (Worster 1993, 2–9). These are the three legs of the theoretical table. Perhaps the historian Roderick Nash put it best: “[nature’s] condition, rightly interpreted, reveals a society’s cultures and traditions as directly as does a novel or a newspaper or a code of laws” (Nash 1990, 1). Environmental history is a multidisciplinary approach, involving the natural sciences, anthropology, cultural geography, sociology, and history and allowing us to look at the catalysts for human change that have often been ignored.

The study of the relationship between humans and their surroundings is not new, but as a separate field of historical inquiry, its roots can be traced to the end of the 19th century, with the pioneering American historian Frederick Jackson Turner. Turner argued that the American character was shaped by the frontiersman’s interaction with nature as he moved west, leading to such traits as self-reliance and populism. Although Turner has been largely discredited (in no small part because his frontier included only white men), he nonetheless started historians of the American West thinking about how this clash affected the development of the region. By the late 1920s, they were joined by a group of French historians who formed the *Annales* school. These historians argued that history can only be complete by studying the “*longue durée*,” by which they meant the study of all modes of physical and social change over a major period of time. This meant looking at all aspects of the population, from the daily habits of the peasantry to the evolving impact of humans on the land. Perhaps the most famous *Annales* historian was Fernand Braudel, who in 1949 produced his massive, two-volume work, *The Mediterranean and the Mediterranean World of Phillip II*, which detailed changes to the environment in great detail.

By the 1960s, a postwar generation of North American historians began questioning the type of history that had been taught in U.S. colleges for a century. This history dealt almost exclusively with politics and the men who shaped government; a banner in the history department at Johns Hopkins University

summed it up best: "History is past politics; politics is present history." These new historians began promoting social history, arguing that history is changed by the masses of common people, not by a few great politicians and military leaders. The birth of this field coincided with a rise in global awareness, shaped in a large part by the moon landing in 1969. The pictures broadcast from the moon showed the earth as a fragile, limited planet, one in stark contrast to the limitless world most people in Europe and North America had been led to envision. The culmination of this emerging consciousness was the first Earth Day in 1970; that same year Roderick Nash developed a course entitled "American Environmental History" at the University of California at Santa Barbara. Over the past 35 years, environmental history has spread to all corners of the earth.

Environmental historians, while enmeshed in social history, ask a different set of questions than do social historians. The historian Carolyn Merchant has listed a number of them, which deserve to be repeated here:

How and why did people living in a particular place at a particular time use and transform their environment? How did people of different cultural backgrounds and of both genders perceive, manage, exploit, and conserve their environments? What different economic forms, or modes of production (such as gathering, hunting, fishing, farming, ranching, mining, and forestry), evolve in particular habitats? What problems of pollution and depletion arose under industrialization and urbanization? What political and legal conflicts, struggles, and compromises emerge over resource use and conservation? How did people's attitudes toward nature and their mental constrictions of nature change over time? (Merchant 1993, 1)

All of these questions will come into play as we make our way through the environmental history of South Asia.

ENVIRONMENTAL HISTORY AND SOUTH ASIA

Although the types of questions environmental historians ask are similar everywhere, they do of course differ by region. South Asia is no different; it is a unique area with specific geographic and social characteristics that must be addressed. Indeed, since nature has controlled life and death in South Asia for millennia, environmental history has been written on the subcontinent for at least a century; it simply has not been classified under the new nomenclature. Secondary literature devoted to the relationship between society and its environment started to be written in the early 1960s; the groundbreaking early work of historians such as Bernard Cohn and Ranajit Guha comes to mind. In the 1970s, graduate

students were writing dissertations on regional and local history. Searching through records in districts and villages, they came into personal contact with environment and culture, which helped shape their theses. Finally, in the 1980s, a new school of modern South Asian history was born as a response to what the theorists saw as a preponderance of emphasis on institutional history at the expense of the marginalized. Subaltern Studies, as the school was called, emphasized the peasants and workers as designers of their own fates rather than simply as pawns for institutions promoting specific regions, castes, or political groups. As Ranajit Guha, the leader of the Subalternists argued, "To acknowledge the peasant as the maker of his own rebellion is to attribute a consciousness to him" (Ranajit Guha 1983, 4). To understand this consciousness one has to hear the voices of the peasants in their own locality, which includes understanding their relationship with their surroundings. As such, many volumes coming out of the Subaltern Studies School were environmental histories, such as David Arnold's work on famines in Madras, or David Hardiman's study of small dams in Gujarat (Arnold 1984, 62–115; Hardiman 2006, 300–322). As we shall see throughout this study, in the past quarter of a century, environmental histories of South Asia have abounded. Because India has always been primarily a peasant society, environmental histories, in deed if not in word, have been produced in South Asia for far longer than there has been an official discipline for them.

It need hardly be noted that throughout its history India has been primarily peasant oriented. The acknowledgment that the subcontinent has historically been a peasant society carries with it a set of determining factors, the most immediate of which is that for the peasant the smooth functioning of the universe is a life-and-death issue. Season must follow season; it must rain when it should rain, and it must not rain too much or too little. It should not stay cool too long, and the fiery heat of the summer must disperse in time for the monsoon. This has meant that Indian agriculturalists have traditionally had an interaction with their environment that is emotional and personal, as well as physical. It is not surprising that the roots of India's indigenous religions (and every other religious tradition of the great civilizations) are found in gods of nature.

Given this relationship, the impact of the population on the land was not as significant as in many nonagrarian societies, particularly those of industrialized Europe and North America. India followed a pattern common to agrarian societies. The first inhabitants were hunters and gatherers; they would have been nomadic, traveling to different areas once they had exhausted the food supplies in a given territory. They would have had comparatively little long-term effect on the land. They were followed by the earliest form of agriculture, which was slash and burn. This type of subsistence would have had more effect on the environment, because the practice involved cutting down groves and burning

them to make fields. The ashes would be left on the ground and would fertilize the soil. Slash-and-burn agriculturalists did not, however, know the value of rotating crops, or leaving fields fallow to nourish the soil. As a result, they would have to move on to other forests every few years. Still, their impact was relatively light.

Sedentary agriculture was a different matter. Once a population permanently settled in a certain area, tangential effects appeared. The people now needed permanent housing. They needed water for bathing and cooking, and they needed fire. This meant that the nearby forests would begin to disappear at a more rapid rate than ever before. If the settlement was far away from a water source, wells would be dug, and irrigation systems built. This would begin to drain the groundwater that had been building up for millennia, as well as put pressure on the rivers; often it could exacerbate massive flooding. Women tended to have more children once sedentary cultivation became the norm, so the population would expand rapidly. Finally, once people settled, commerce became a central means of subsistence. Artisans appeared, making beads, pottery, statues, tools, weapons, and many other types of crafts. These products required mining, baking, and carving, all of which affected the surrounding environment. For the first time we find visual evidence that nature must have been permanently transformed by the proximity of humans.

It was the industrial revolution and the rise of capitalism, however, that had the most impact on the land. This might seem strange in a country like India, which did not directly experience the immediate and vast changes brought about by these two factors. However, the rise of protocapitalism provided much of the incentive for exploration and the introduction of a policy of free trade. In particular, industry played a crucial role in the rise of commodification. This is a term we will see often in this book; simply put, it means a change in attitude and values in which nature is seen only for its value as a commodity. Nature loses any intrinsic worth; it is not to be valued for its beauty or inspiration, but only for its financial worth. As we shall see, commodification would seem to be at odds with indigenous Indian values, and indeed in many ways it was. However, beginning in the late 15th century, European merchants would arrive in large numbers, bringing with them an environmental ethic that saw nature merely as a commodity and an accompanying desire for a vast array of products from South Asia. These included spices, jewels, timber, cotton, tobacco, indigo, and opium, all of which had to be culled from nature. When the demand for goods culminated with the British colonization of India in the last half of the 18th century, commodification became an established policy in the subcontinent. Nor did this end with independence in 1947. Today, the various countries of South Asia struggle with deforestation, the building of huge hydroelectric dams that dispossess

thousands of people from their lands, and urban pollution on a wide scale. The impact of humans on the subcontinent is today as forceful as it has ever been.

With this brief background in environmental history, we will embark on a journey that I hope will show a side of Indian history that will be different from what the reader may have imagined or perceived. As we are only beginning to fully understand, civilizations are in part formed physically, ethically, and culturally by their relationship with and attitudes toward nature. This is particularly true in India, where the vast agrarian population depended so much on its interaction with nature.

THE ENVIRONMENTAL SETTING

PHYSICAL CHARACTERISTICS

Jawaharlal Nehru once described India as a country whose unity was found in its diversity. By this he meant the differences in language, customs, occupations, social status, and ethnicity were the glue that held India together. The same could be said for the geography of the Indian subcontinent. Ranging from the tallest mountain in the world (Mount Everest, at 29,035 feet) to the Thar Desert (where temperatures can climb to over 120 degrees), South Asia encompasses a diverse climate and ecology that can rarely be matched by the other countries of the world.

The subcontinent covers more than 1.7 million square miles, or 10 percent of the Asian continent. It began to emerge some 50 million years ago, when India broke off from the supercontinent of Gondwana and collided with the Eurasian continent. Out of this tremendous force was formed one of the three broad geographic areas of South Asia: the Himalayan mountain range in North India and Nepal. This mountain chain is the highest in the world, with more than 100 peaks higher than 24,000 feet. The mountains have helped the peoples of India in many ways. Culturally, they have provided a barrier against many invasions; when the Mongols swept across North Asia and into Europe in the 13th century, India in general escaped the brunt of their attacks. The mountains also act as a barrier against the fierce, cold winds that sweep across the northern plains. The glaciers and snows in the mountains provide the sustenance for agriculture in North India. The Himalayan range is both a physical and cultural actor in the evolution of South Asia and its people.

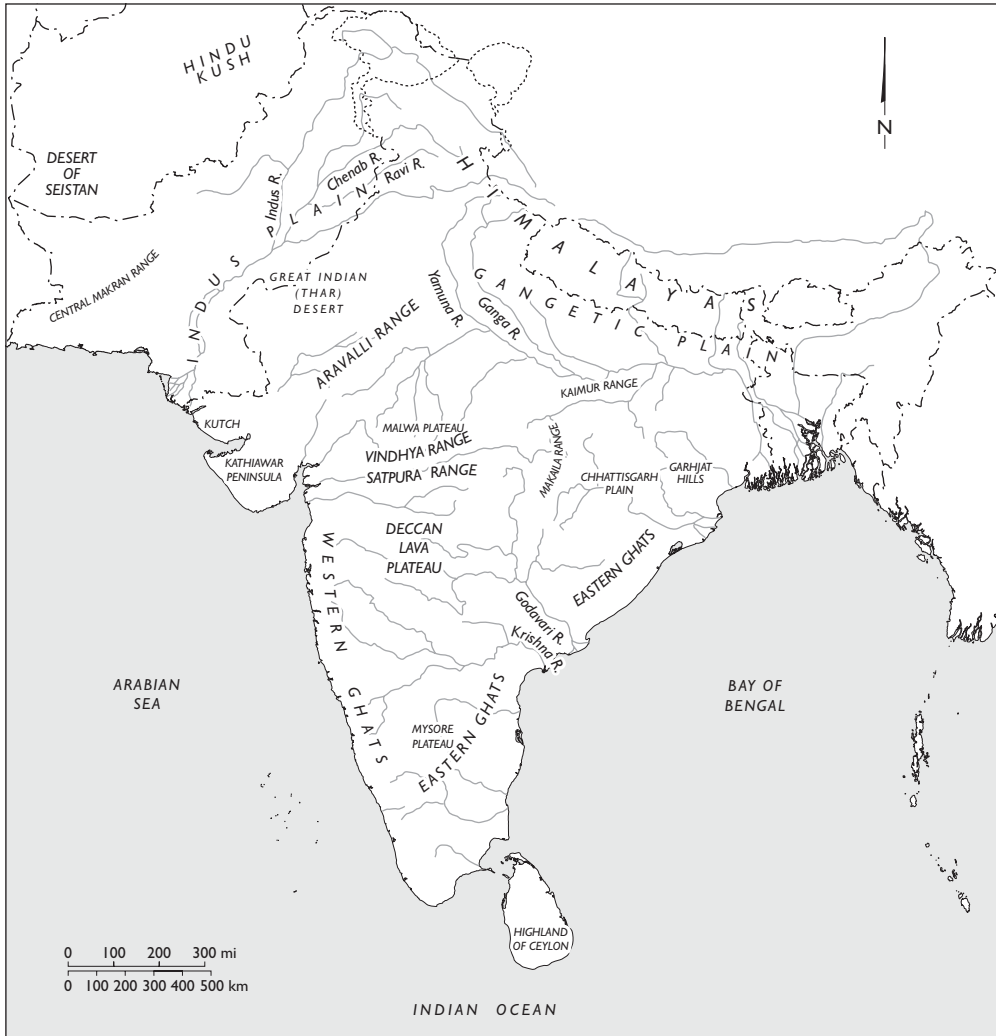
The rivers coming out of the Himalayas define the second broad geographic area, the Indo-Gangetic Plain. Often called the “breadbasket” of India, this agricultural belt contains approximately 40 percent of India’s population on less than 10 percent of its land. Defined by its two greatest rivers, the Indus and the Ganges, the region contains dozens of tributaries and independent rivers sweeping down from the mountains. Many of these rivers, particularly the tributaries of the two major rivers, gently deposit highly fertile soil along their banks. It is in these areas in northwest India that we find the earliest evidence of sedentary



Himalaya mountains at dawn, near Annapurna, Nepal. (Corel)

agrarian society. Others, like the Kosi, which flow directly from the mountains at a high velocity, can carry so much sandy silt that they will leave the land they traverse completely uncultivable for upwards of 50 years. In 1877, the Kosi became so volatile that it threw out enough sand to cover the smokestacks of a nearby indigo factory. The rivers thus play a fundamental role in the settlement and the development of societies. Rivers also have an extraordinary cultural and religious significance. For Hindus, the Ganges River is particularly sacred. The city of Varanasi, positioned on the river, is the spiritual capital of Hinduism. Hundreds of thousands of Hindus annually make the pilgrimage to the holy city to carry out ablutions in the water of the Ganges. The river plays a fundamental role in death as well; as the holiest river in Hinduism, the Ganges is the site of many cremations, and the river is lined with crematory ghats.

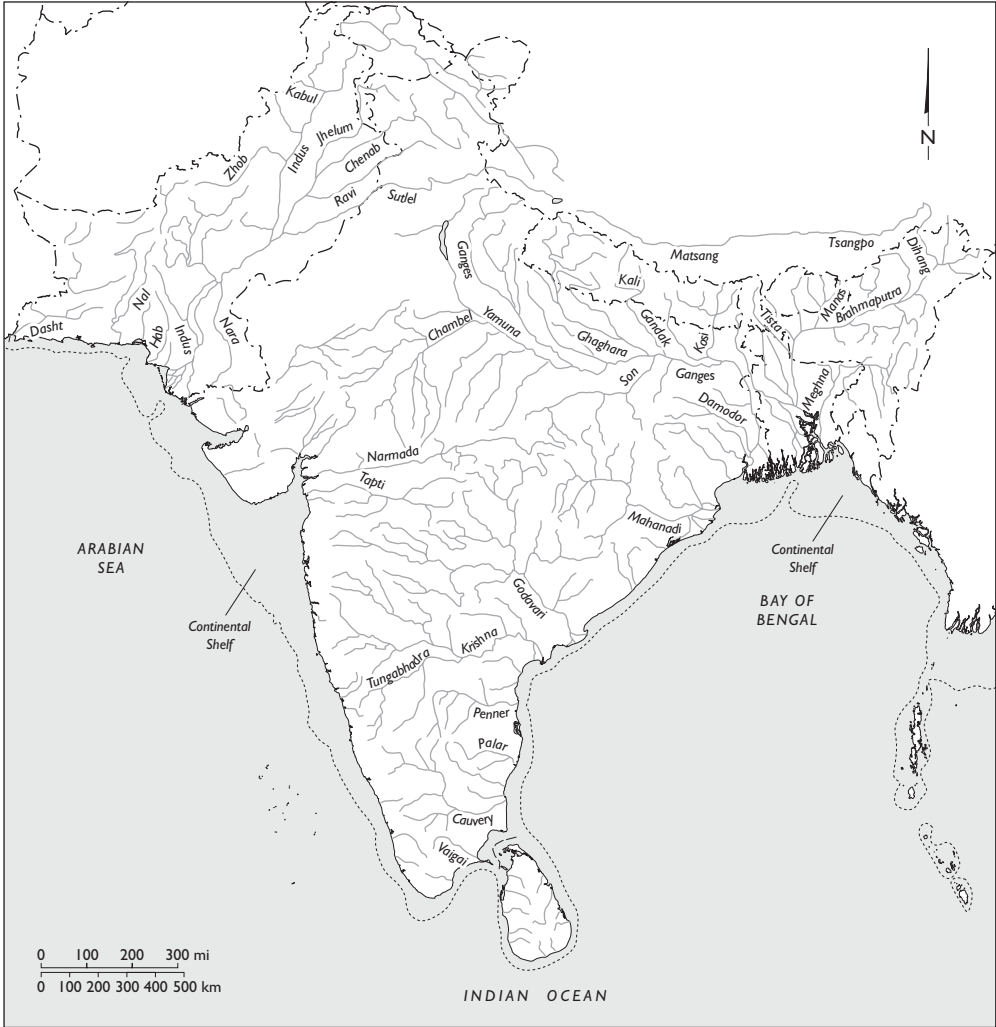
The third geographic region is contained in the southern peninsula of the subcontinent. This area is separated from the north by the Vindhya Mountains, which run east and west across central India. The peninsula is much more dependent on the monsoon rains than is North India. The monsoon rains are generated by the heat of summer, during which temperatures in the south commonly reach triple digits for months at a time. As the land heats up the air, the hot masses



Physiography of South Asia.

rise, leaving a vacuum for cold air, which races across the oceans carrying massive amounts of precipitation in its clouds. The monsoon, which may last from the middle of May until September, but commonly peaks during June and July, forms the lifeblood of South India, while helping to define both the land and the people. The monsoon rains fill the riverbeds, lakes, and irrigation canals and provide water for the crops in the wilting heat of summer. The monsoon winds were decisive in establishing early settlements in South India and forming early trade routes.

The monsoon rains are also critical in understanding the cultural and environmental evolution of the nation of Sri Lanka. The teardrop-shaped island is defined by coastal plains and a hilly and mountainous central section, which



Rivers of South Asia.

allows for a variety of food and cash-crop production ranging from tea plantations in the inland regions to fishing along the coast. As the tragic consequences of the 2004 Asian tsunami have shown, however, Sri Lanka is also subject to the furies of ecological change.

CLIMATE

South Asia’s climate is also indicative of a diverse range of environmental factors and, thus, is difficult (and, indeed, counterproductive) to categorize. Taking into account the problems of generalization, the year can still be divided roughly into

three dominant seasons. The hot season generally runs from March through early June, with temperatures in the Thar Desert climbing to higher than 120 degrees. The rainy season follows from June to the end of September. This is, of course, the critical season for the agrarian population; between 50 and 90 percent of India's average precipitation falls during this season. Temperatures do not diminish drastically in the monsoon, but the winds and rain bring relief from the heat. The cold season, running from October through February, completes the year. Average temperatures in these months range from approximately 50 degrees in the Himalayan foothills to the mid-70s in the central plains, and they hover in the low 80s in the south.

Precipitation is a category that is similarly difficult to average. Rainfall in sections of Balochistan, in southwest Pakistan, averages 6 inches annually. In July 2005, the city of Bombay received more than 37 inches of rain in a 24-hour period, which was a record for India. These extremes are indicative of the wide range in rainfall found across South Asia. For instance, mean annual rainfall in Pakistan averages about 16 inches, while Bangladesh receives about 60 inches annually. Precipitation in India ranges from an average of 30 inches in the northeastern foothills to 4 inches in the deserts of Rajasthan; southern India averages 16 inches, while the area around Bombay receives about 22 inches each year. Interestingly, the average precipitation for both Nepal and Sri Lanka is between 40 and 100 inches, depending on the region.

PLANT AND ANIMAL LIFE

Any region that contains the world's tallest mountain as well as one of its driest deserts will no doubt have a large amount of biodiversity. South Asia's plant and animal life provide some of the most variegated flora and fauna on earth, ranging from alpine vegetation to coastal mangrove swamps, and from tropical rain forests to desert scrubs, with 90,000 species of animals and half that many species of plants.

Vegetation in South Asia can generally be classified by elevation and precipitation. Thus, the mountainous region is known for its decreasing diversity at higher elevations; oak is found up to 7,000 feet, pine up to 12,000 feet, and grasses and moss beyond. Moving south from the mountains we find the largely cultivated region of the Indo-Gangetic Plain, which was once densely covered by rain forests. Peninsular India gives way to deciduous plant life. The bioregion of the southern coastal area, and much of Sri Lanka, is labeled as tropical dry evergreen forest. This region is composed of such hardwood trees as teak and sal, which have been treasured throughout history for their timber. Farther east along

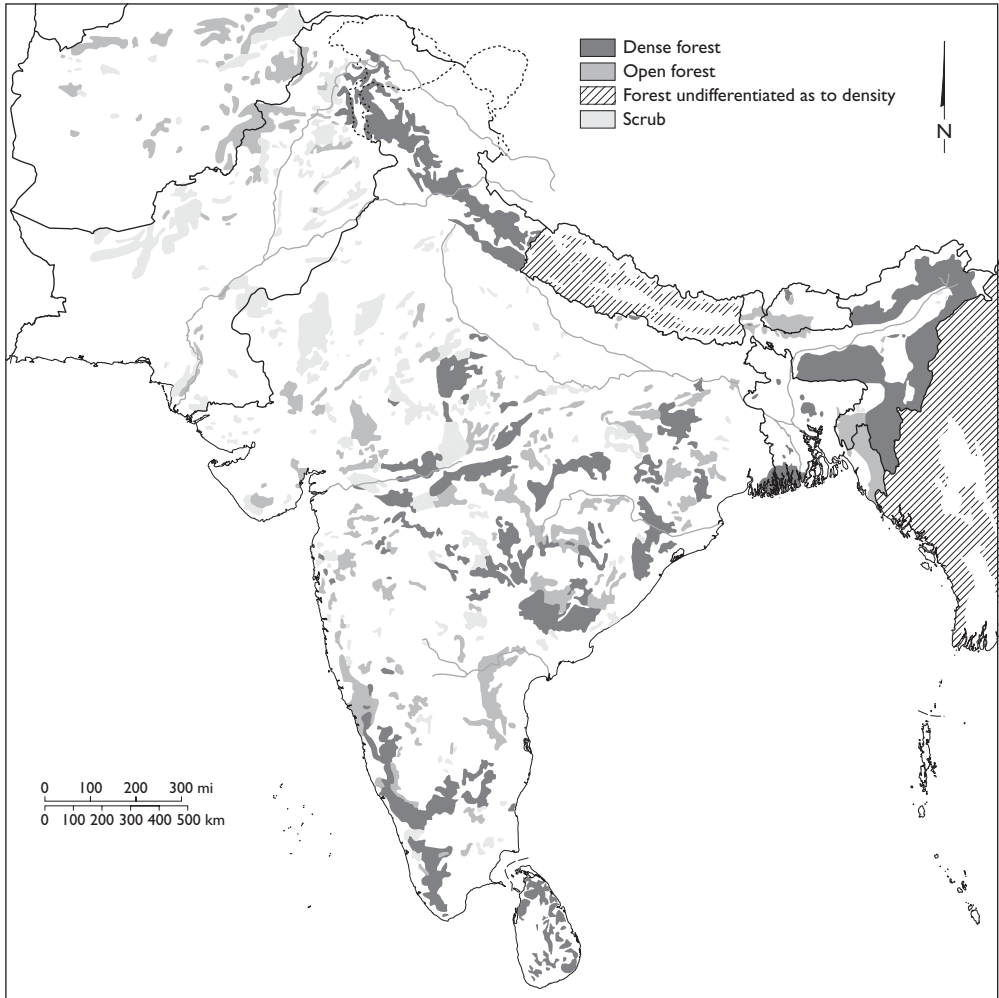


Tea plantation near Coonoor, Tamil Nadu. (morgueFile)

the Indian coast is the crop that drove Europeans to India beginning in the 16th century—spices. Moving north through the Deccan, forests of deciduous trees and scrubs abound. The mountainous foothills of East India historically produced some of the best bamboo in the world. Many of those groves were replaced by indigo and tea plantations as colonialism and capitalism moved into the region in the 18th century. The circle is completed back to the Himalayas with its preponderance of oaks, maples, and evergreens.

The variety and value of the vegetation of the Indian subcontinent make up one of the foundation stones of the environmental history of the region. In cultural terms, for example, sacred groves of trees were reserved as spiritual offerings, which irritated the commodity-minded Europeans to no end. The desirability of forests in particular and the consequent devastation caused by deforestation and the commodification of Indian agriculture explain much of the imperial history of India, Nepal, and Sri Lanka.

Along with plant life, animal species became so commercially valuable that in 2000, according to the World Conservation Union, more than 70 Indian species



Forested areas of South Asia.

were endangered. These species ranged from the Asian elephant to the Indus River dolphin. The diversity of Indian animal life is sadly mirrored in the statistics on endangered species.

As with much of the natural in India, animals were spiritually linked to Hinduism. Most famous were the associations of certain animals with many of the most engaging gods. Some of the earliest icons found by archaeologists are those of Nandi, Shiva's bull. Two of the most popular figures in the religion are Ganesh, who has the head of an elephant, and Hanuman, the monkey god. Nature thus is associated with the sacred in multifaceted ways.

The most famous mammal in South Asia surely is the Bengal tiger, which is the national animal of both India and Bangladesh. This magnificent cat, which in 1900 roamed the northeastern section of the subcontinent in the tens of

thousands (figures vary from 40,000 to 100,000; the lower number is probably more accurate), fell to a population of 2,000 in the 1970s, primarily because of hunting and deforestation. That number has since doubled, primarily thanks to the Sunderbans Wildlife Sanctuary in West Bengal and Bangladesh.

Although the tiger may be the most famous mammal in the region, it is rivaled in lore by many more, including the Asian elephant, many types of deer and antelope, cat species including the leopard and jungle cat, and of course the cow, which can be found in virtually every rural and urban location in India. Smaller mammals include the snake-eating mongoose, made famous in Rudyard Kipling's *Jungle Book* classic "Rikki Tikki Tavi." Monkeys abound throughout South Asia, the rhesus and langur being the most common.

The Indian subcontinent has more than 1,200 species of birds, including the spectacular peacock, which is the national bird. Predatory birds include eagles, hawks, and vultures, and common smaller birds include the crow and sparrow. The mynah bird is famous for its ability to mimic speech in multiple languages. Waterfowl include the heron, stork, and crane. The most notorious reptile is surely the king cobra; other common snakes are the python and the krait. Other reptiles include crocodiles and turtles, while amphibians, in the form of toads and bullfrogs, are found and heard everywhere in South Asia. Among the thousands of species of insects are various types of beetles, spiders, and brightly hued butterflies (visit www.worldwildlife.org for more information).

India's ecological characteristics are important in ways that might not be immediately obvious. The relationship between culture and nature is arguably stronger in India than in any other civilization. As noted earlier, all agrarian societies tend to have a sacred relationship with the world around them, as survival depends so much on the whims of nature; this is why the early gods of virtually every civilization were gods of nature. As we shall see, the great religions of India can only be fully understood by taking into account the role of nature in the spiritual life of the believers. In addition, the commodification of nature, beginning in the 17th century, had ramifications to the agrarian population that still haunt the subcontinent today.

CULTURAL GEOGRAPHY

Cultural geography, which here is defined as the effect of the regional environment on the development of a specific culture, is an essential tool for following the development of early societies in South Asia. Migration patterns and assimilation must be understood in terms of the great mountain ranges stretching across North India and along the Deccan coasts. Trade with the Arabian

Peninsula and Southeast Asia depended on the monsoons. The lure of the riches of "the Indies," which spread from Arabia across the Mediterranean, was a powerful incentive for European exploration. The relationship between environment and societal change is crucial to understanding South Asia.

The late historian and anthropologist Bernard Cohn has noted three general cultural zones in India: nuclear zones, route zones, and zones of relative isolation (Cohn 1987a, 100–135). Nuclear zones are those areas that are the most desired by invaders, for either strategic or economic reasons. In economic terms, these zones are found primarily in river basins, where the soil is fertile and water plentiful. As we shall see in the next chapter, the Indus Valley is a prime example of an economic nuclear zone. Others in North India would include the riparian areas of Bengal and Orissa. In South India, many of the deltas and coastal plains could be classified as nuclear zones. These zones tend to be culturally diverse, because over time numerous armies and settlers have moved into them. Thus, the Indus Valley had an early history of Indo-Aryan contact, and the Indus Delta was the site of the first Islamic incursion into North India, in 711. Strategically, one of the important nuclear zones can be found in the plains outside Delhi, known as Kurukshetra. Historically, if an invading group controlled Kurukshetra, then the Gangetic Plain, with its fertile land and great forests, was open for the taking.

Route zones are the areas armies and migrants passed through on their way to nuclear zones. These areas tended to be less heterogeneous, for although their contacts with armies and migrants were frequent, they were also temporary. These zones often were plateaus that were barren but not desertified. Zones of relative isolation were composed of deserts, mountains, or jungles. They had little contact with invaders, and consequently their populations were often seen as culturally unique, particularly by the British colonial government, which labeled them "tribals" and administered them in units separated from the bulk of the provincial populations.

In terms of cultural synthesis, the mountains and the coasts have been crucial to the development of Indian society. Invaders have two routes of access into South Asia: through the mountain passes or by sea. The primary routes through the Hindu Kush, leading from contemporary Afghanistan into Pakistan, are the Dorah and Bolan passes and, most famously, the legendary Khyber Pass. There are no easily accessible passes through the Himalayas in the far north and east. As a consequence, invaders by land tended to come from eastern Europe and western Asia. The long peninsula of India played a major role as well. Trade with Southeast Asia and the Arabian Peninsula not only led to India having a major cultural influence on those areas (particularly Southeast Asia), but also alerting the West to the riches, material, and otherwise of the subcontinent.



Khyber Pass in Pakistan. (Pakistan Mission to the UN)

Islam was first established in India less than a century after the death of the prophet Muhammad and, of course, Christopher Columbus was looking for a quicker route to “the Indies” (a vague reference to the “Spice Islands,” in South-east Asia) when he stumbled on the Americas. Another cultural impact of the mountains and coasts may be found in the difficulties of leaving the subcontinent once the invaders had arrived. The passes were closed for a good portion of each year, and the sea journeys were long, tedious, and dangerous. As a result, invaders tended to stay in South Asia, rather than conquering and leaving. The Greeks were the major exception to this, but that may be due to the fact that Alexander the Great faced a mutiny from his generals shortly after he arrived in Northwest India. The other invaders, including the Aryans, Mughals, and British, settled in India. They tended to become acculturated, with varying degrees of difficulty (the British tried desperately to segregate themselves); in turn, they wove portions of their cultures into the fabric of Indian society.

Of course, other, nongeographical factors identify certain zones; language, religion, history, and other cultural indicators must be taken into account when

defining the various social regions. Nonetheless, the role of environment is crucial to the development of South Asian societies.

EARLY HUMAN ACTIVITY

It is by now a truism, but the further back we go into South Asian history, the more difficult it is to talk about human interaction with the environment with any precision. We must depend on archaeological discoveries and interpret what they tell us. While this will give us a picture of life in prehistoric times, it is not a clear picture. This is especially true with the Paleolithic period, or as it is commonly known, the Old Stone Age. This period is divided into three chronological categories: the Lower Paleolithic (approximately 2,500,000 to 200,000 BCE), the Middle Paleolithic (200,000 to 30,000 BCE), and the Upper Paleolithic (30,000 to 10,000 BCE).

Remnants of stone artifacts found in the Punjab are estimated to be 2 million years old; hand axes from the same area appear to be approximately 500,000 years old. We know that fire was controlled during the Lower Paleolithic as well, although estimates vary greatly, from 1.5 million to 240,000 years ago. Once fire was channeled for human use, there is no doubt that it must have had a major effect on the environment in which it was used, with clear evidence of intentional forest fires dating back to the Indus civilization (Thapar 2002, chapter 3).

Tools dating from the Middle Paleolithic have been found in the Thar Desert, suggesting that this region must once have had a verdant, humid climate. Other smaller sites, located away from large sources of water, suggest that groups may have separated into communities, perhaps based on kinship ties. By the time of the Upper Paleolithic, more sophisticated artifacts show that hunter-gatherers had settled in the northwest, central, and eastern coastal regions of the subcontinent. Domesticated cattle, sheep, and goats gradually appeared during this time, and pastoralism began to take hold. Naturally, grazing had a dramatic impact on the land. In the same period (about 30,000 BCE), stone tools and the bones of both humans and animals have been discovered in several caves in the wetlands of Sri Lanka, suggesting settlement of some kind in that area.

The Mesolithic period (or Middle Stone Age) began in South Asia in about 10,000 BCE and lasted until the advent of settled agriculture between two and three millennia later. The Mesolithic saw the bow and arrow replace the spear as the dominant weapon for hunting, thus allowing a greater distance between the hunter and the hunted. Movement away from rivers and the use of tools made from materials not found along the banks suggest an evolving sense of



Ruins of Mehrgarh on the Bolan River in Baluchistan, Pakistan. (Corbis)

security within their environment. Primitive cultivation begins to appear, although not in any sense that could be considered sedentary agriculture; constant migration was still the clear social pattern.

The Neolithic period (New Stone Age) signaled the emergence of the centrality of settled agriculture and pastoralism. This would have brought steadily increasing pressure on the environment. Overgrazing and overcropping, which are often outcomes of settled agriculture and pastoralism, can cause serious damage to the land in terms of its nutrition and fertility. The earliest example of such a settlement is Mehrgarh, on the Bolan River in Baluchistan, whose origins date back to around 7000 BCE. The remains of granaries containing wheat and barley suggest a more advanced agrarian society than seen before, as does the herding of domesticated animals, such as cattle and sheep. Its destruction may also be a portent of effects of environmental negligence (Thapar 2002, 77). Evidence shows that at least part of the site was submerged by the Bolan River, suggesting that the river changed its course because of an accumulation of silt and sand. What role human ecological impact played is unknown, but certainly timber clearing and grazing were central functions of this settlement. Pressure

on forests and pastures are known causes for massive flooding and siltation in riparian areas.

The sites at Mehrgarh provide the first indication of the advent of numerous settlements along the Indus River and its four major tributaries (the Jhelum, Chenab, Ravi, and Sutlej), which together form the broad geographical region known as the Punjab ("the five waters"). The sites collectively are known as the Indus civilization and, accurately or not, are often characterized as the bridge between prehistory and history in South Asia. Chapter 2 looks at early civilization in both northern and peninsular India and takes up the still-contentious issue regarding the impact of migration from Northwest Asia, often called the "Aryan invasion."

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THE INDUS CIVILIZATION AND THE ARYAN IMPACT

THE INDUS CIVILIZATION

Romila Thapar, a historian of ancient India, has noted that settled agriculture paved the way for the rise of chieftainships, because early farming was carried out by family and clan members (Thapar 2002, chapter 4). This could also explain the rise of the Indus civilization, which lasted for roughly a millennium, from about 2600 to 1600 BCE. The excavation of the two great cities of this era, Harappa and Mohenjodaro, has produced a large number of artifacts, and more are being found in the smaller communities along the five rivers and close to the Indus Delta. In 1921, the colonial government started financing the digs, but sites had been known and utilized by the British for a century before (they had even used the ancient bricks from the region to support the railway tracks!).

The two great cities themselves were a marvel of sophistication and uniformity, unlike any found in other great ancient civilizations. To generalize, the towns themselves, containing residences and businesses, were laid out in a grid: the major roads ran north-south, and the less-traveled streets ran east-west. The towns were often walled, but not always. To the west of the town was a citadel, used for meetings, administration, and possibly for religious purposes. The citadel was well protected by walls rising up to 50 feet high. Burial grounds were also situated outside the town.

The houses generally were built around a courtyard. Multiple living quarters surrounded the courtyard (ranging from 6 rooms to 30), and the ruins suggest that the greater houses had more than one story. The houses included a kitchen and bathroom, with drainage systems made of kiln-burned bricks to remove the waste. Blocks of houses may have consciously separated residents by occupation or kin, suggesting an ancient link to the caste system. Workers' quarters were found outside the walls of the town; they may have been located here for their proximity to the granaries and kilns, or perhaps the inhabitants were socially ostracized from the population of the town.

The large granaries are evidence of a successful agrarian system. Since the ancient seals of the Indus civilization show tigers, elephants, and rhinoceros, we must assume that there once were great jungles in the area, which would have been cleared to grow crops. The major grains were wheat, barley, and millet (used to make flour and cereal and to feed the livestock). That the Indus farmers were able to maintain a surplus is evidenced by the quantity and size of the granaries. One of their other major accomplishments was the growth of cotton (preceding Egypt by several hundred years), which was made into yarn and spun into cloth. Early clothing included the dhoti, the piece of wraparound cloth that is still worn by Indian men, and shawls for the upper body. This multicropping would suggest that irrigation must have played a role in agriculture at this time.

In addition to agriculture, the region was known for its crafts. These delicate and skillfully built items were traded beyond the Punjab into Mesopotamia and north to Tibet, and indeed to the Persian Gulf. The excavated city of Lothal, located at the delta of the Indus and Arabian Sea, has an edifice that some have identified as a dockyard; this was possibly the main port for overseas trade. Beads were the primary craft, and they were made with ivory, copper, and gold. Pottery spinning was also well-established in the larger cities. Perhaps the most interesting and puzzling handicraft that has been found are the seals. Made out of steatite (a type of soapstone), the seals were usually square, with depictions of animals, humans, or mythical creatures. These depictions tell us a great deal about the flora and fauna of the Indus Valley, and they also suggest early religious icons. One of the most common figures was that of the bull, which (as noted earlier) was associated with Shiva. The elephant, rhinoceros, and tiger were also depicted. The seals also included inscriptions, meaning that a portion of the population was literate. The seals were probably used in several ways, as stamps of authority for the local chiefs or administrators, as insignias for businesses and merchants, and perhaps for religious purposes. The lingam, the phallic stone that became a symbol of Shiva the creator, and the yoni, representing shakti, the universal energy and power of the female, have been found throughout the region, suggesting that some of the major figures associated with the Vedic religion were present in the Indus civilization.

The causes for the disappearance of the Indus civilization are still being debated. Beginning in the late 19th century, and continuing through much of the 20th century, Indologists believed the civilization was massively and rapidly overrun by peoples from the Russian steppes. This Aryan invasion, as it has been called, has been widely discredited over the past two decades. The evidence instead suggests that major environmental changes were the cause of a gradual rather than a dramatic decline of the urban areas. Around 1700 BCE, earthquakes caused by the shifting of tectonic plates brought about massive flooding, leading



The 5,000-year-old ruins of Mohenjodaro in present-day Pakistan. The city is carefully constructed in a grid pattern using uniform bricks. (Corel)

the Indus River to change its course. This would, of course, have severely disrupted agriculture, leading to disease and famine. Bones found at Mohenjodaro show that those skeletons that had first been interpreted as having massive injuries, instead showed signs of terminal disease.

Climatic change may have played a crucial role as well. In part because of aridity, the Indus Valley today is limited in its ability to produce an equal variety and amount of food crops without genetically altered seeds and enormous irrigation projects. Gone also are the massive forests that would have to have been present for the elephants, tigers, and rhinoceros found on the seals to exist. Finally, migration in the direction of the Ganges-Jamuna doab ("two rivers") plains to the east could also have led to a gradual depopulation of the urban areas.

In the end, however, the existence of the Indus civilization is of more consequence than its destruction. A remarkable administrative and social organization can be seen developing in these cities. The uniformity in weights, the grid patterns of the cities, and the common kiln-dried bricks, all of the same approximate size, indicate that many of these communities used the same architectural

plans for their cities. The drainage systems show a broad knowledge of engineering, while the design of the cities would have necessitated an understanding of geometry and surveying. Even the calendars suggest an advanced knowledge of the skies. The Indus communities developed cloth weaving for the first time; they were the original domesticators of chicken and other poultry, and their handicrafts were prized throughout the communities of North and West Asia. The legacy of this great civilization leaves its imprint on all of us today.

SOUTH INDIA

The history of the Deccan and the southern peninsula is often tied to the Aryan migration in the north, but in fact South India produced parallel, independent cultures at the same time as the Indus civilization. Although the separation between the north and south was never as wide as it has sometimes been portrayed, there is no doubt that Deccan and peninsular cultures evolved in fashions distinctly different from those of the Indus Valley and Gangetic plains. Thapar notes that because the Deccan was composed of volcanic rock, which required less effort to carve, the plateau became a centerpiece for temples, monasteries, and art (Thapar 2002, 44). The Ajanta Caves in Maharashtra, which contain masterpieces of Buddhist rock carvings from the second century BCE, are perhaps the most famous of early South Indian culture and art.

Although Deccan societies may have developed later than in the north, the main factors were ecological rather than cultural. In the ancient period, the plateau was an effective example of Cohn's "route zone," which we discussed in Chapter 1. The region was covered with forests, often inhabited by adivasi groups and "forest people," who were considered dangerous and outside the boundaries of civil society. Only in later centuries, when elephants were domesticated for labor, and the value of the timber trade was realized, did nontribal settlers migrate to the areas. As these commercial settlements began to prosper, links were established with coastal merchants; soon, passes through the Western Ghats led to an intricate trading system involving Deccan merchants, coastal shippers, and merchants from the west (Thapar 2002, 44–46). Trade with Arabia and the Greek and Roman empires was well established centuries before the Common Era.

Although the south was much dryer than the north, its plateaus, hills, and river valleys were homes for agriculturalists from a very early period. Southerners had domesticated sheep and cattle in many settlements along the rivers. While the Krishna and Cauvery rivers were the main population centers, the Tapti and Godavary had settlements as well (Allchin and Allchin 1968, 161–176). On the



Ajanta Caves, whose murals date back to 200 BCE. (Philip Baird/www.anthroarchaeart.org)

Deccan plateau itself, early settlers found fertile, black basalt soil, often called “cotton soil” for obvious reasons. Indeed, several centuries before the Common Era began, cotton was already being spun in Maharashtra. In the Neolithic Era, communities settled in these fertile regions, building rock houses or living in caves. By the Iron Age these hills had been terraced and irrigated, and stone or earth embankments served as drainage tanks. This archaeological evidence is an important clue to understanding the environmental history of early South India. Irrigation tanks are a clear sign of a change from nomadic and swidden agriculture to settled, irrigated farming. As Bridget and Raymond Allchin have noted, the “picture is remarkable for the sense of continuity which it affords” from ancient to modern times (Allchin and Allchin 1968, 219–249, 264). In the south, where aridity defines agriculture in ways different from in the north, the creation of complex irrigation systems has always been crucial to survival. As we shall see throughout the rest of the volume, irrigation in South India has played a part in prosperity, famine, war, and peace.

The variegated environments we have glimpsed so far, with their charms and calamities, their spiritualism and natural imagery, did not, of course, exist in a vacuum. The labyrinth that incorporates the interaction among societies

and cultures across the spectrum of both northern and peninsular South Asia was, and is, inherently tied to the nature of which all the inhabitants are a part. Perhaps one of the best early examples of the effect of the environment on historical change is the ancient migration of clans from Northwest Asia.

THE ARYAN MIGRATION

Between 2000 and 1500 BCE, peoples from southern Russia began migrating in all directions. Several reasons have been suggested for this, all in some way related to ecological change. Overgrazing is one possible reason; the migrants were pastoral and likely had large herds of livestock. Overpopulation is another possibility; as the tribes settled in a particular region, they grew at a much more rapid rate than their limited resources could manage. It is likely that the various tribes battled each other over these resources. Climatic and geomorphic change may have been a catalyst as well. Whatever the reason (probably a combination of factors), various kinship groups began migrating, primarily into northern Europe and southwest Asia. Their primary commonality was a root language, which is called either Indo-European or Indo-Aryan. This is an important caveat, for the Aryans, as they were known, were described as a race by the late 19th- and early 20th-century Indologists, culminating with the corruption of this idea in fascist Europe. In fact, although we shall continue to call them Aryans, the term refers to a common historical language base and not a racial group. Indo-Europeans from the Russian steppes took this base language and transformed it into the Romance and Germanic languages of Europe and the Sanskritic languages of Asia (Thapar 2002, chapter 1). That these were linguistic ties can be seen from the similarities in words: take, for instance, the Vedic god of fire, Agni. The relationship to the English word “ignite” is quite obvious. Although there is no denying that the Aryans did refer to themselves as “pure” and to the indigenous population they encountered as *dasa* (“dark”; in later times the meaning evolved to “servant” or “slave”), it is quite possible that they were referring to a general perception of the society rather than to skin tone.

We must also be cautious when interpreting the texts. The bulk of our knowledge about early Aryan society comes not from archaeological sources but from the early Aryan religious texts known as the Vedas. The Vedas were oral texts, passed down from generation to generation. Because they were composed and memorized by the priests (who came to be known as brahmins), they naturally emphasized the story of the elite priestly and warrior groups. While we need to take this limited view into account, we can still learn a great deal from the sacred texts.

The earliest of the Vedas is the Rig-Veda, which dates from about 1500 BCE but was not written down until 600 BCE. It tells the story of a linguistic group that came over the mountains and into the Indus Valley, where the clans most likely encountered the survivors of the Indus civilization. The Aryan clans brought with them the two-wheeled chariot, probably drawn by horses, which were not indigenous to India. It was earlier assumed by Indologists (as mentioned in Chapter 1) that a massive invasion by the Indo-Aryan speakers accounted for the destruction of the prehistoric civilization. We now know that in fact they migrated gradually into the Punjab, moving slowly eastward, fighting each other, as well as *dasas*, over fields and pastures. The *Brahmanas*, part of the later Vedic texts, suggests that the Aryans moved into the Ganges Valley at the beginning of the first millennium BCE, while the great epic *Mahabharata* features a huge battle outside Delhi, on the plains of Kurukshetra, in approximately 900 BCE. The period covered spans several hundred years, so the eastward migration must have been slow (Thapar 2002, 110–117; Burrow 1975, 20–29).

At this point the Indo-Aryan clans began the process of settling down. Although cultivation became increasingly important, pastoralism was still the dominant means of existence. This can be seen by the increasing importance of the cow as the primary currency among the clans. The cow was extremely valuable alive, providing milk and other dairy products, fodder, and fuel, and it was particularly valuable for pulling the plow. It may be that the proscriptions against cow slaughter began around this time, as well as the early veneration of the animal. However, it was only the clearing of the dense jungles in the Gangetic Plain and the advancement of irrigation that brought about sedentary agriculture.

As the clans began to practice cultivation, social change and conflict became intensified. These changes, involving social stratification and power hierarchies, were legitimized by both conquest and myth. As our knowledge is primarily textual, it is important to look at the evolution of the Aryan religious tradition as the clans moved eastward and transformed themselves from nomads to settlers.

THE VEDIC RELIGION

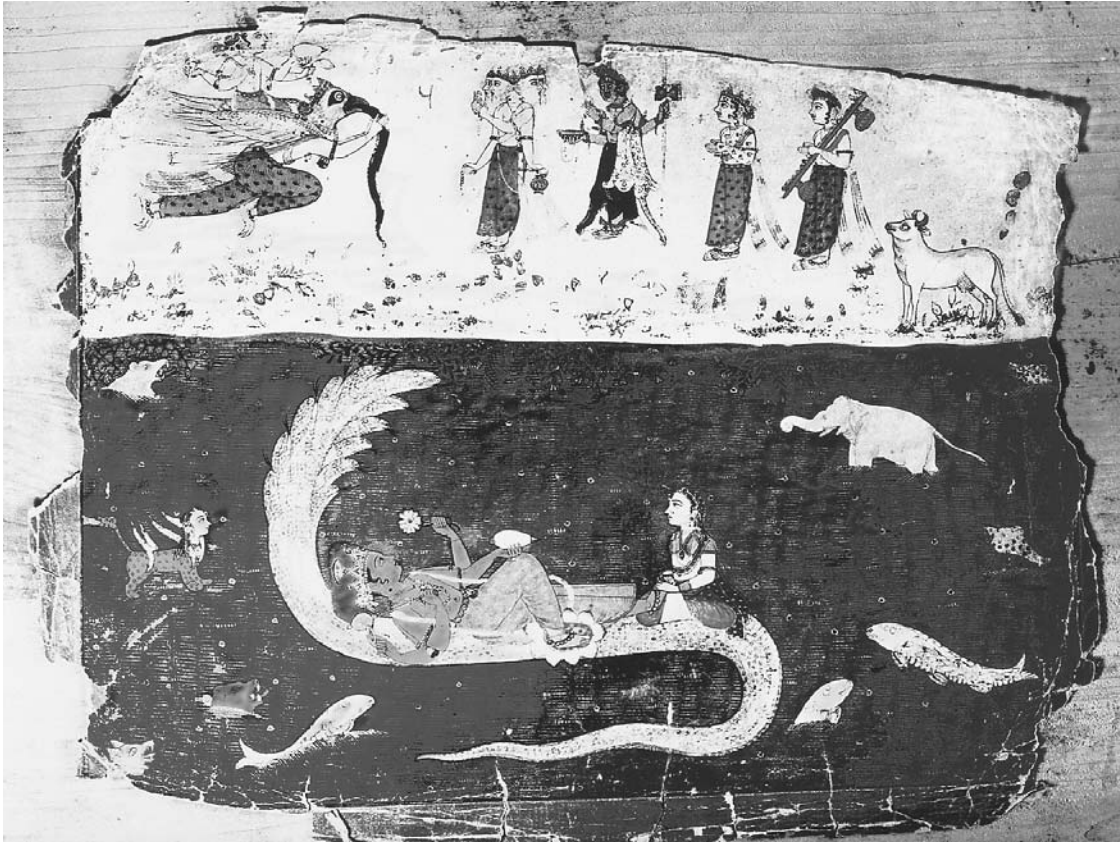
When the clans left the Russian steppes around 1500 BCE, they brought with them their gods of nature, which had similar characteristics wherever the Indo-Aryans migrated. The Norse and Greek gods of thunder, fire, war, and so on, all derive from the same myth. The Rig-Veda mentions 33 gods, of which 4 are the greatest: Indra, Varuna, Agni, and Purusha. Indra was the warrior, who used his

thunderbolt to kill the serpent Vritra, freeing the sun and the water, and thus giving the world light and sustenance (Burrow 1975, 21–24). Varuna, as the guardian of the cosmic order, was extraordinarily important, for he made certain that season followed season in the prescribed manner. Agni was the god of fire, sometimes seen as the priest of the gods and the god of the priests. Because all offerings involved sacrifice and fire, Agni was constantly called upon to convey the priestly offering to the specific god for which it was meant. Purusha was the god of human creation, whose self-immolation created the four great varnas (or castes as they became commonly known in European parlance) in Aryan society. From his mouth came the brahman, or priest; from his arms came the kshatriya, or warrior caste; from his thighs came the vaishya, the merchant and artisan caste; and from his feet came the shudra, the laboring caste. There is no mention of the outcaste or “untouchable” class (who today are called dalit), perhaps because the rituals involving purity and pollution, which came to define caste groups, had not yet come into prominence.

The use of religion as a legitimizing factor for social structure is apparent in the myth of Purusha. Already in Vedic society there were divisions; the king (raja) and his advisers (nobility, for lack of a better term) were separated from the “commoners,” or *vish* (from which came the term vaishya). The fact that the brahmans emerged first out of Purusha’s sacrifice is indicative of the emerging power of the priestly class, which would soon be challenged by the kshatriyas.

Other significant gods in the pantheon were also related to nature. Surya was the sun god, much the same as Helios in the Greek pantheon. Mitra was a close friend and companion of Varuna, while Rudra, the god of storm, was later transformed into the great Hindu god Shiva, suggesting an incorporation of Indic culture into the Vedic religions. Finally, the other major god in Hinduism, Vishnu, appears at this time; Vishnu is also involved with the cosmos, traversing the three levels—sky, earth, and ocean.

The Vedic tradition revolved around sacrifice to the gods, which could only be performed by the brahmans and which gave the priests their power. The early sacrifices did not involve living creatures, but rather they were centered on the sacred utterances (mantras), chanted by the priests, to ask the gods for specific favors. If we keep in mind that the population depended on the smooth functioning of the cosmos, which only happened if the gods were placated, then the ability of the priests to please the gods made them powerful indeed. In the later Vedic period (about 700 BCE) the horse sacrifice (*ashvamedha*) appeared. This sacrifice was a ritual that symbolized the rising power of the raja, who became the patron of the *ashvamedha*. A stallion was let go to wander for a year, followed by guards to protect him and trace his path. All the land that the horse traversed was



Vishnu sleeping between the two periods of cosmic evolution—between the destruction of the world and the creation of the new universe. He and Lakshmi lie on the serpent, Ananta, who represents eternity. Hindu, 17th century, Rajasthan. (Werner Forman/Art Resource)

declared the land of the raja; if it was in the hands of enemies, they had to be conquered. When the horse returned it was ritually sacrificed. The *ashvamedha* signified the emerging conflict between the brahman and kshatriya castes over temporal authority, which was a catalyst in the emergence of the other great Indian religions, Jainism and Buddhism, whose importance to environmental history will be detailed later.

The question of spiritual versus earthly power led to attempts by other caste groups (especially the warriors) to look for other means of spiritual fulfillment within the Vedic parameters. Some found their outlet in the rise of asceticism. Known as sadhus or yogis, these non-brahmans believed that through austerity, severe penance, and mysticism, they could achieve an understanding of the cosmic order. Other kshatriya started to question the focus of the priests on the ritual sacrifice, arguing that access to the universal soul should be available to many levels of society. These later philosophers found common ground in the

texts known as the Upanishads, which would become the bridge between the Vedic religious tradition and what we now call Hinduism.

The Upanishads ushered in the last phase of the religious autocracy of the brahmins. These later texts emphasized three fundamental changes: from theistic plurality to unity; from objectivity to subjectivity; and from materialism to spiritualism. The first of these was realized by the emergence of Brahman as the supreme god, in the form of the universal soul. Other gods became manifestations of the One. The belief in *maya*, the illusion of temporal happiness, suggested a renewed sense of mysticism, while the concept of *atman*, the individual soul, which was constantly seeking unity with Brahman, emphasized spirituality. However, this unity might not come in a single lifetime; it could take many cycles to reach the understanding for the *atman* to become unified with Brahman. As Romila Thapar has noted, this evolution had a fundamental role in the emergence of the concept of transmigration of the soul and the incipient caste system (Thapar 1966, chapter 2).

ARYAN SOCIETY

We turn again to the ancient texts for a sense of Aryan society in the last millennium before the Common Era, in the form of the two great epics, the *Mahabharata* and the *Ramayana*. The *Mahabharata* is the greatest repository of Hindu legend in existence. Written sometime in the four centuries that straddle the beginning of the Common Era, at 90,000 stanzas it is probably the longest poem in the world. The *Mahabharata* (roughly translated as either “The Great Story of the Bharat Clan” or, because Bharat is the Sanskrit name for India, “The Great Story of India”) tells the story of two groups of cousins, the Pandavas and Kurus, who are seemingly in constant warfare over control of a kingdom near modern-day Delhi. The climax of the story is a great battle fought on the plains outside Delhi, which is believed to reflect the actual Battle of Kurukshetra in about 900 BCE, which opened the middle Gangetic plains to the Indo-Aryan invaders and marked the change from nomadic tribalism to settled cultivation and the consequent rise of kingdoms.

The *Ramayana* (“The Story of Ram”), likely composed earlier than the *Mahabharata*, begins in the city of Ayodhya, situated on the Ghagra River in contemporary Uttar Pradesh, located in the heart of the middle Gangetic Plain. The epic tells the story of Ram and his wife Sita, who is kidnapped by the demon god Ravana and eventually rescued by Ram. Like the *Mahabharata*, the *Ramayana* is important in the development of Hinduism, but it also gives us clues to the Gangetic society of the time. The epic describes courtly intrigue and rituals.

It also details Ram's exile to the forests surrounding Ayodhya, which were filled with villains and demons, suggesting that actual conquest of the area was limited and that forest dwellers still roamed the area in large numbers. These woodsmen could well have been the mythologized, non-Aryan "barbarians." Indeed, the historian Stanley Wolpert sees the *Ramayana* as an allegorical history of the Indo-Aryan expansion into South India (Wolpert 2004, 38–39).

As clans or collections of clans settled permanently, they needed each other for protection from possible intruders, both Aryan and non-Aryan. They gained their identity from their tribal kinship and their geographic regionalism. Since multiclan settlements usually had a recognized ruling clan (based on land possession), a hierarchy would be established, with a town surrounded by lesser villages. These communities were based on trade. Various markets were situated in the center of the town, unless the town was specifically organized as a religious or administrative center. In both systems the town was the nucleus of the extended village community. State formation, however, was dependent on surplus production for trade, for purchasing power, and for insurance against drought or flood (Thapar 2002, 142). Such a surplus was only made possible by the development of double or triple cropping seasons, so irrigation technology must have advanced significantly since the Indus civilization. One of the Jatakas, which relay stories of the life of the Buddha (566–486 BCE), details a rivalry between two clans over a dam that they had cooperated in building. Apparently conflict over whose fields would be irrigated first led to a bitter split between the two clans. The tale suggests that irrigation, and the complexities in land control and cultivation that accompanied it, had become a staple fixture by the time of the Buddha.

According to Buddhist texts, 16 kingdoms were spread across North India by the sixth century BCE. These kingdoms were ruled by kshatriya rajas, whose ritual status was confirmed by their patronage of sacrifices. The village became the fundamental unit for administration, production, and tax collection. Groups began to be defined by occupation; landholders and merchants had different statuses, and cultivators were increasingly confined to the shudra class/caste. Revenue officers surveyed the cultivated areas, measuring the land and evaluating the types of crops grown. The various village headmen were responsible for collecting the revenue, which was a percentage of the produce. The raja's officers brought it to the central collection center, where it would be stored, sold, and traded. Increasingly, society became stratified according to ritual and occupation.

By the sixth century BCE, three kingdoms would emerge as the contestants for ultimate control of the middle Gangetic Plain: Kashi, with its capital in the holy city of Varanasi (Banaras) on the Ganges; Kosala, adjoining Kashi to the

northeast; and Magadha, south of the Ganges River in Bihar. Magadha would win this fight for preeminence, setting the stage for the first empire in Indian history, the Mauryan. This region also produced two figures who would have a profound effect on environment and ethics in South Asia: Vardhamana Mahavira (ca. 599–527 BCE), the founder of Jainism, and Siddhartha Gautama, who became known as the Buddha.

THE MAURYAN EMPIRE AND THE CLASSICAL AGE

The Mauryan Empire, which stretched from Afghanistan to Tamil Nadu, was so inalterably tied to the development of and changes in the Indian religious tradition and subsequent perceptions of nature that we cannot understand the impact of the empires without first looking at the evolution of spirituality throughout South Asia.

BUDDHISM AND JAINISM

As we saw in the last chapter, both Mahavira and the Buddha were born at a time when numerous chieftainships developed within the Gangetic Plain. Both of these religious figures were the sons of chiefs of states north of the Ganges, and both were dissatisfied with their contemporary spiritual world. Although there are many differences in the paths the two religious leaders established, they both disputed absolute Vedic authority.

Siddhartha Gautama grew up in the lap of luxury in the Sakya kingdom, yet he was spiritually empty. At the age of 16 Siddhartha left his father's palace, seeing for the first time the misery that surrounded him. The only content person he met was an impoverished monk. At this point he began to believe one could only find spiritual serenity through renunciation. Siddhartha then began his "Great Going Forth," wandering across the eastern Gangetic Plain as a mendicant. At the age of 35, in the kingdom of Maghada, he found himself seated beneath a pipal tree (henceforth known as the Bodhi tree, or Tree of Enlightenment). He made a solemn vow not to leave his seated position until he had solved the riddle of suffering. On the 49th day, Siddhartha discovered the answer and thus became the Buddha (the Enlightened One). He spent the rest of his life preaching and serving others, dying peacefully in Vaishali at the age of 80.

The Buddha's philosophy may be roughly encapsulated in his early and most important sermon, The Sermon of the Turning of the Wheel of Law. In this he

preached the Four Noble Truths that became the core of his teachings: Life is Suffering; Suffering is caused by Desire; Suffering can be stopped if Desire can be stopped; Desire can be stopped by following the Eightfold Path. The Eightfold Path is a series of steps leading to the development of wisdom, ethical conduct, and mental discipline, and eventually to nirvana, or the extinction of the cycle of rebirth for the spirit.

Like the Buddha, Vardhamana Mahavira was born in the sixth century BCE in North Bihar, the son of a kshatriya chief. He too left his princely life when he was approximately 30 years old, becoming a wandering mendicant. He joined a group of nudist ascetics, but he became dissatisfied with their practices and eventually split from the cult, taking his followers and forming a new religious sect, Jainism. When Mahavira died of self-starvation ca. 468 BCE, he became the last of the 24 tirthankaras, or “ford-makers,” who had crossed from one world to the next.

The central premise of Jainism is that everything in the universe, from rocks to humans, has a *jiva*, or, imprecisely, a soul. The sophistication, or “power” of the soul is based on the complexity of its senses. So the *jiva* of a rock has only the sense of touch, while the *jiva* of a human has all five senses and thus is more complex and, importantly, easier to harm. Because violence against other souls causes bad karma (defined as the result of one’s deeds; this term will be explained in full later in this chapter) and thus imprisons the soul for reincarnation, *ahimsa*, or absolute nonviolence, is a central theme of Jainism. Not only are Jains vegetarians, but they may not eat certain root vegetables that are considered easily injured; for the same reason, they may not plow the land. As a consequence, Jains tended not to be farmers; instead, they turned to banking and commercial interests.

Although Buddhism and Jainism vary in many of their practices, there are two fundamental aspects about which they are in agreement. Both Buddhism and Jainism offer paths to nirvana that do not require the intervention of a brahman. Both religions also emphasize nonviolence and the ethical treatment of all the universe. This last precept became national policy at the height of the Mauryan Empire.

THE MAURYAN EMPIRE

In 326 BCE, Alexander of Macedonia entered India through the Hindu Kush. He met Porus, king of the Nandas, in a great battle on the Jhelum River in the Punjab. The Greeks defeated the Nandas, but the victory came at a high cost. By the time Alexander reached the Beas River, his troops were mutinous. As a result,

Alexander turned back, leaving behind several of his most competent generals (most notably Seleucus Nicator) to administer until his expected return. Alexander's sudden death in 323 BCE put a stop to any plans of further conquest, leaving North India open for the establishment of the Mauryan Empire (ca. 326–184 BCE).

Chandragupta Maurya established the empire on the banks of the Ganges; its capital was the city of Pataliputra, located on the contemporary site of the Bihar capital city of Patna. With the guidance of his counselor Kautilya (often seen as an early Machiavelli), Chandragupta quickly moved north to take advantage of the vacuum left by the Greeks. He negotiated a treaty with Nicator in 303 BCE, ceding parts of eastern Afghanistan and western Baluchistan in return for an exchange of ambassadors.

Chandragupta, with the assistance of Kautilya, established the first centralized government of India. Although revenue from agriculture still provided the major form of wealth, the Mauryas began to tax every form of commodity and service. Prostitution, fishing, gambling, and other forms of entertainment and occupation were taxed. The commercialization of nature was established in this early period as no wasteland was allowed to be settled or any tree to be felled without permission of (and presumably payment to) the state. Corvee (labor tax) was also established under the Guptas; the lowest caste of shudras was required to cultivate wasteland and work in the salt mines, all for the welfare of the state.

The collection of all the revenues required a large network of collectors and spies, which meant the establishment of a great administrative infrastructure. By the time Chandragupta abdicated in 297 BCE to become a Jain monk, he had established an administrative model that is in use in contemporary India: provinces divided into divisions, subdivided into districts and then into villages. Chandragupta's son Bindusara ruled for three decades, but it is his grandson Ashoka who established the Mauryan dynasty as the first all-Indian empire. Ecology was one of the central themes of his reign.

ASHOKA AND ECOLOGY

The reign of Ashoka (269–232 BCE) is the first sustained period for which some detailed records exist, thanks in large part to the edicts Ashoka had carved on rocks and pillars across India. These edicts, as we shall see, form the basis of the emperor's *dhamma*, or his emphasis on righteousness and hope for an ethical and just society. From these edicts his concern for the environment becomes evident.



Four-headed Ashokan pillar at Sarnath. (The Art Archive)

Ashoka began his reign despotically; for the first eight years of his rule he ruthlessly consolidated his empire. His campaigns culminated in 261 BCE with the Battle of Kalinga in the modern state of Orissa, during which more than 100,000 people were killed. As he toured the battlefield, he became disgusted with the wasted lives and wanton destruction. Kalinga was an epiphany for Ashoka; shortly thereafter he converted to Buddhism. Indeed, the emperor must be partially credited for the spread of Buddhism to the far corners of Asia; his own son, Mahinda, became a missionary in Sri Lanka, helping to spread the religion to the south.

To spread his philosophy of righteousness across his own country, Ashoka established his rock edicts, and later, his pillar edicts (Ashoka’s four-headed lion pillar is today the official symbol of India). These edicts urged tolerance and

respect for all peoples and for all religions. He renounced war as an instrument of policy and promoted nonviolence toward both people and animals. To this end he outlawed animal sacrifice and banned the killing of certain animals on specific dates. He urged the planting of medicinal herbs for healing both people and animals. Finally, his edicts strongly promoted vegetarianism, although Ashoka himself was never able to stop eating meat completely. Nonetheless, he is credited with spreading vegetarianism across India, a culinary practice that continues today.

Ashoka's other great contribution to the environment was in the realm of public works. As translated by Romila Thapar, one of his edicts expresses his concern for the well-being of his subjects and his pride in his public works: "On the roads I have had banyan trees planted, which will give shade to beasts and men. I have had mango groves planted and I have had wells dug and rest houses built every nine miles. . . . And I have had many watering places made everywhere for the use of beasts and men. . . . I have done these things in order that my people may conform to *dhamma*" (Thapar 1966, 88). In addition, the emperor lined the major roads with inns and restaurants; he also was responsible for building some 84,000 stupas, to see to the spiritual needs of travelers and villagers.

Although Ashoka certainly showed concern for his natural surrounding, we need to be careful not to lionize him as a great early environmentalist. His policy was one of Buddhist ethics combined with pragmatism. Thus, groves of trees might be reserved (from clear-cutting) for religious purposes; sacred groves, whose fruits were an offering to the gods, were (and are) common in India. However, other groves might also conspicuously be set aside for state revenue rather than protection, to make certain that the government received the profit from the trees. Nonetheless, by the time of his death in 232 BCE, Ashoka had established precedents that are in practice in India today. His public works were the basis for British development along the Grand Trunk Road, which runs from near Dhaka in Bangladesh to Peshawar near the Afghan border, while vegetarianism, as noted, is still practiced by a large number of South Asians.

Ashoka's concept of *dhamma* did not, however, succeed him. With his death, the empire began to disintegrate. Without primogeniture, fraternal wars at the death of an emperor weakened the dynasty. The huge system of spies, revenue collectors, and other administrators was a great drain on the economy, and consequently, taxes had to be raised. It is also an anomaly of premodern empires that the larger they were, the more difficult it was to control the periphery. As a result, those regions farther away from the center tended to declare autonomy when given the chance. The Mauryan Empire continued in name until 184 BCE, but it rapidly split into regional kingdoms after the death of Ashoka.

IRRIGATION IN EARLY INDIA

The fragmentation of the Mauryan Empire allowed for the ascendancy of new kingdoms, particularly in eastern and southern India. In East India, the Kalingas reemerged as the dominant force, while in the south three Tamil kingdoms appeared: the Cholas to the east, the Pandyas in central South India, and the Keralas to the west. A great deal is known about these kingdoms, thanks to the great Tamil literature of the time, the *Sangams*. Among many other aspects of administration, the Sangams provide a window into some of the remarkable public works in ancient India and Sri Lanka. Other sources include Kautilya and the Greek ambassador to the Mauryan court, Megasthenes.

We have seen in Chapter 1 that irrigation was present in North India during the Indus civilization and that by the time of the Buddha, canals and dams were common throughout the Gangetic Plain. In the third century BCE, Kautilya included the destruction of dams and levees as a strategy during wartime. In the same period Megasthenes wrote about district administrators annually inspecting sluices, which channeled water into various canals, to ensure that every group entitled to the water received equal shares.

Although the history of irrigation in South India is equally ancient as that in the north, the methods were quite different. The south does not receive waters from the Himalayas; instead, it relies on smaller streams from the milder slopes of the Vindhya range and some of the Ghats. Some of these riverbeds are dry before the monsoon begins, and even during the monsoon season the rains may be sporadic; consequently, reservoirs (or tanks, as they are also called) are necessary for storing water. As such, the *Sangam* literature refers to tanks, ponds, and bunds (embankments) scattered throughout the countryside, mostly built by village cooperatives.

The greatest period for irrigation in early South India occurred during the reign of King Karikala in the second century of the Common Era. Karikala, king of the Cholas, faced constant flooding on the Cauvery River. The Cauvery was something of an anomaly for southern rivers in that it carried in its bed large amounts of silt, which not only caused it to change its course frequently, but also silted up adjoining lands, making them uncultivable for long periods of time. To control the flooding, Karikala commissioned the building of the Grand Anicut. This great dam was more than 1,000 feet long and almost 200 feet wide; the irrigation canals feeding out of the reservoir watered almost 70,000 acres. So well built was the anicut that Arthur Cotton, arguably the most famous civil engineer in the history of the British Raj, admitted that he used its design for 19th-century irrigation works on the same river system. In addition, Cotton's improvements on the dam make the Grand Anicut the oldest functioning irrigation works in



Grand Anicut on the Cauvery River in Tamil Nadu. (M. Badrinath)

the world today. Although the Cauvery may provide the most famous example of sophisticated works, most South Indian rivers had irrigation systems. North of the Cauvery, the Godaveri River system, for instance, contained a web of canals that irrigated much of the modern state of Andhra Pradesh. In addition, *karambus*, or oblique dams, stored waters in reservoirs that crisscrossed the region described in the *Sangams*. So developed were the irrigation works of South India in the early Common Era, that both the British and contemporary engineers wondered at their construction (Schmitthenner, forthcoming).

Perhaps the only irrigation works of the ancient period that could compare to those in South India would be those found in Sri Lanka. As a British agent noted in 1855, "It is possible that in no other part of the world are there to be found within the same space the remains of so many works for irrigation, which are at the same time of such great antiquity, and of such vast magnitude, as in Ceylon" (Brohier 1934, 1). Indeed, irrigation works can be traced back to the legendary King Vijaya, who with his followers came from Orissa to settle in Sri Lanka in the fifth or sixth century BCE.

The physiography of Sri Lanka is usually portrayed by three zones: the Wet Zone, in the southwest corner of the island; the Intermediate Zone, which

traverses the central and southwestern portion; and the Dry Zone, which covers nearly two-thirds of the nation, in the northern, central, and far southwestern sections. Although the fertile soil of the cleared land of the Dry Zone was conducive to rice crops, the amount of rainfall was not. The average rainfall in the zone was between 50 and 70 inches, but it fell in harsh bursts that often damaged the terrain and was followed by a long dry season. As a result, irrigation was a necessity for sedentary cultivation.

Large-scale irrigation projects began in the fifth century BCE; by the third century of that era the Sri Lankans had invented the valve pit, which is still used to regulate the flow of water into tanks and reservoirs. By the first century BCE, water from tanks was being raised mechanically by a system of levers. The first five centuries of the Common Era saw the use of technology that still astonished engineers in the 20th century, with credit going to the two great kings of the era, Mahasena (274–302) and Dhatusena (460–478) (Brohier 1934, 1).

The two great rivers of the northern dry zone (where the capital city of Anuradhapura was located) are the Kala and Malwatu, which flow west into the Gulf of Mannar; unfortunately, these two rivers turn into trickles for much of the year. Thus, it was necessary to siphon water from the Mahaweli, the longest river in Sri Lanka at 205 miles, and its tributaries, which flowed from the central mountains east into the Bay of Bengal. Mahasena built a water-transport system whose centerpiece was the Kantalai tank. The water for this reservoir flowed out of a 25-mile-long canal and ended in a tank that covered 4,560 acres, held by a dam that was 50 feet high. King Dhatusena outdid his predecessor, building the Kalinga Anicut, which was overseen by a remarkable 40-foot statue of the Buddha. The tank itself was seven square miles in area, fed by a 54-mile-long canal and controlled by an anicut measuring more than three miles long and 36 to 58 feet high.

The social implications of these structures were profound. The population of the Dry Zone expanded dramatically, leading to a demand for still more water; by the 11th century, the area had a vast, sophisticated network of irrigation works, arguably unlike any in the world at the time. The rice surplus allowed for the temples, statues, and palaces that made Anuradhapura and the later capital of Polannaruwa such exquisitely beautiful cities. The success and prosperity had a negative effect on the Sinhalese as well, attracting the attention of Tamils in South India, who captured Anuradhapura repeatedly, leading to the movement of the royal family south to the city of Polannaruwa, and finally to the Sinhalese migration to the southern sections of the island in the late 13th century. This Sinhalese migration exemplifies one of the tangential, but critical results of the relationship between environment and human society.

THE CLASSICAL PERIOD

The Gupta Empire (320–550) is often seen as encompassing the classical era in Indian history. One of the problems with this designation is that the term is really too vague to describe the accomplishments during this period. If we were to categorize the great achievements of the period in a short space, we would probably need to confine them to literature, art and architecture, and mathematics. For our purposes, the rise of the merchant class and the evolution of Hinduism are equally important, for both these factors deeply affected the relation between nature and the population in early Indian history and spread the perceptions of that interaction across Southeast Asia.

The empire was founded in Magadha by Chandra Gupta in 320. Taking advantage of the lack of any unified governance across North India, he had himself crowned *maharajadhiraja* ("king of kings") in the old Mauryan capital of Pataliputra. Under his son Samudra and his grandson Chandra Gupta II, the Guptas claimed control of North India from Afghanistan in the west to Assam in the east. The reign of Chandra Gupta II (375–415) is considered the height of Gupta culture and creativity.

A great deal is known about the period, primarily from two chroniclers of the era: Fa Hsien, a Buddhist monk from China, and Kalidas, the court literatus in the reign of Chandra Gupta I. The Guptas were Hindus, and although Buddhism was not suppressed, the kings gave their monetary support primarily to the brahmins. As a result, this was arguably the height of temple building in North India. Similarly, cave art prospered during this time. The 30 Ajanta caves in central India, which were originally dug as a retreat for Buddhist monks, display some of the greatest examples of Indian painting. The art includes painstakingly drawn depictions of the life of the Buddha, along with more temporal figures. Literature of the period also reached new heights. Kalidas has been called "the Shakespeare of India," indicating his skill and importance. His most famous play, *Shakuntala*, is infused with heroism and humor, but it is also grounded on the concept of karma. Through Kalidas' work we begin to see the ascension of Hinduism, taking the place of Buddhism as the dominant religion.

Some of the greatest early Indian achievements were in the field of mathematics, as encompassed in the genius of one man, the astronomer Aryabhata. In 499 he calculated pi to be 3.1416. He estimated the length of a year at 365.36 days, and he claimed that the earth was round and that it revolved on an axis. He maintained that eclipses were caused by the shadow of the moon passing in front of the sun.

These advances in art, culture, and the sciences were due in large part to a surplus in wealth brought about by the advancement of trade. Indian merchants

had established ports on the Arabian Peninsula, in Java, and into Indochina. They now traded across the Mediterranean region, throughout Southeast Asia, and east to China. The merchants took with them such items as spices, precious and semiprecious gems, sandalwood, pearls, and some textiles. They would return with ivory from Africa, horses from Arabia, and silk from China. In the process they carried traditional values and religious philosophies throughout Asia, but particularly in the southeast. The trip to China, a primary trading partner, was difficult and dangerous, but the trade winds to Java, Sumatra, and the Malay Peninsula made that journey relatively safe. From ports established in these three regions, traders could then sail to Indochina and on to China. In the Mauryan era they were often accompanied by Buddhist missionaries, and in later years Hinduism was spread across many parts of Southeast Asia. Such was the influence that in the eighth century an Indian would feel at home on Java, where Sanskrit was the *lingua franca*, and where the great Hindu epics were the basis for the traditional shadow-puppet plays (as they are in predominantly Muslim Indonesia today). To the north, on the island of Sumatra, the kingdom of Srivajaya became a great center of Buddhist learning (SarDesai 1989, 40–47).

Indian settlements in Indochina began some seven centuries earlier than those in modern Indonesia. The kingdom of Funan, in the Mekong Delta, was established in the first century, legend has it, by the marriage of an Indian brahman to an indigenous princess. There is no doubt that the influence of India was strong, carrying over from Funan to the establishment of the kingdom of Angkor in the ninth century, and the building of the great temple compounds in the 12th century, of which Angkor Wat is the most famous. The temples at Angkor cover an area of 120 square miles and were dedicated to the Hindu trilogy of Shiva, Brahman, and Vishnu. Angkor Wat itself is the largest religious monument in the world.

Religion thus played a critical role in the development of Southeast Asian states; it also influenced the population's views of the place of humans in the natural world. As Hinduism began to evolve and resume its position in Indian culture, largely transplanting Buddhism as the dominant religion, so too did environmental history evolve in India.

HINDUISM

The Heterodoxies had proven to be a real threat to the continuance of the Vedic religion; they had offered spiritual guidance that depended on an individual's action rather than intervention by the priests. The evolution from brahmanic control to a more open Hinduism ingeniously allowed for an

individual relationship with God, while at the same time strengthening the caste system.

As we saw in Chapter 2, the religion had already begun to evolve by the time of the Upanishads, before the birth of Jainism and Buddhism. The primary shift was the replacement of sacrifice with worship as the basic rite. As a result, one's personal relationship with God became the centerpiece of the religion. In this sense, Hinduism became essentially monotheistic; the various gods in the pantheon are simply different manifestations, or forms, of the one God. Vishnu and Shiva are the primary forms, but other famous manifestations include Krishna, Ram, and Ganesh. Through worship and deeds, one may slip the cycle of reincarnation and return to God's essence.

The tenets of Hinduism revolve around the requirements necessary to extinguish transmigration and achieve moksha; these are the concepts of dharma and karma. Dharma may be roughly translated as one's duty to the sacred law; in Hinduism (as opposed to Buddhism) it is inextricably bound to the caste system. For our purposes, the results of one's fulfillment of dharma are measured by karma, which affects one's ascent or descent on the ladder of reincarnation. Fulfilling one's dharma may lead to a rise in the caste system in the next life; neglect of one's dharma may result in reincarnation into a lower caste group. Finally, karma takes into account the issue of purity and pollution, which will be analyzed later in the chapter. Only by performing a series of ablutions may one remove pollution and with it (for lack of a better term) bad karma.

Because caste is integral to the journeys through this world, it is rigid in its social formation. Caste is hereditary, hierarchical, and endogamous. One is born into one of the subgroups (*jati*) of the four basic caste groups, or one is born into a dalit *jati*. One marries within one's *jati*, and descendants are born into the same subgroup.

A great deal of mystery surrounds the creation of the caste system, and scholars have several theories on its development. The late anthropologist Morton Klass suggested that theories of caste fall into the following three general categories:

The Theory of Divine Origin

The theory of divine origin suggests that caste came directly from the ancient texts. As we noted in Chapter 2, the Vedas refer to the god Purusha as having created the four varnas from various parts of his body. Clearer still are the Laws of Manu, written ca. 200, which specifically define and classify the four varnas. Klass argued that this explanation was particularly attractive to European

ethnologists and Indologists in the 18th and 19th centuries, for it easily coexisted with the colonialists' own ideas about class stratification.

The Race Theory

The race theory speculates that the four varnas were based on ethnic characteristics. Because varna can mean "color" in Sanskrit, this theory posits that the system was developed for reasons of blood "purification." It is tied to the Indologists' theory of the Aryan invasion, which claims that the Aryans enslaved the darker Dravidians as *dasas*, which, as we know, can mean "slave," but it can also mean "dark." This hypothesis was primarily promoted in the late 19th century by the ethnologist H. H. Risley, who noted that the lower-caste Dravidian people of South India tended to be darker skinned than the northern population. Risley, however, was very much a man of his time. As such, he saw his theory of racial purity not as an idea tinged with racism, but rather as one that was widely accepted in his lifetime. He further believed in the now largely discredited theory that a massive, quick invasion by the Aryans had led to an immediate destruction of the Indus civilization and its replacement with an Aryan one, due primarily to the innate superiority of the invaders.

The Occupational Theory

The occupational theory suggests that the nucleus of the system, the *jati*, was originally a form of labor guild, which evolved into a social and eventually marriage circle. As the system became ingrained into Hindu society, it became ruled by a set of religious laws rather than marital tradition. Klass explained this development by noting changes to South Asian agrarian society. As agricultural technology advanced, settled farming became the standard method of production. This led to a population boom, which in turn led to a surplus of cultivators, until portions of the population were forced to find occupations apart from farming. A dramatic increase in professions followed, leading to the development of guilds and then *jatis*. This theory also seemed to help to explain the *jajmani* system in rural India. *Jajmani* was a practice of occupational exchange in many villages. Thus, ideally, brahmans would perform marriages and other rituals in return for receiving grain from the kshatriya landholders, clean clothes from the dalit washers, and so on. *Jajmani* was idealized by colonial ethnologists, who exaggerated its practice and outcomes. It did, however, seem to support the claims for those who suggest occupational roots for the caste system. In addition, there is

an emphasis on the ability of environmental evolution to affect societal change (Klass 1980, 35–42, 163–179).

All three of these theories may have played roles in the development of caste. If we look at the regulations that define caste laws, certainly religious tenets and an occupational hierarchy help clarify these rules. Caste regulations often included proscriptions on what work certain *jatis* should be engaged in. So, for instance, in general, brahmans may not plow the land, chamars (a dalit *jati*) may only work with leather, and dhobis (another dalit *jati*) are the traditional washers of clothes. Because dharma largely depends on the issue of purity and pollution, occupation is also important in the cycle of transmigration.

The concepts of purity and pollution, which help decide karma, are entangled in the interactions among caste groups. High status is symbolized by having as little physical contact as possible with lower castes. In theory, brahmans may take only uncooked food from the castes below them. Similarly, the touch of lower castes has different levels of pollution. Finally, purity and pollution are often measured in occupational terms. So, for instance, all bodily excretions are considered defiling; thus, midwives, barbers, and washers are all from dalit *jatis*. So too are those who work with the remains of cows. Physical contact with these groups is ritually polluting in the extreme for the higher castes.

How then to make such a stratified society more open to the lower castes? This change involved two events: the spread of Hindu epics to the local level, and the emerging popularity of the concept of bhakti. The epics, which originated in the two centuries preceding and beginning the Common Era, were fabulous adventures that contained overtones of Hindu doctrine; they were a form of morality plays, but ones in which everyone could participate and enjoy. As we noted in Chapter 2, the two great epics, the *Ramayana* and the *Mahabharata*, have some basis in fact. In terms of their importance to Hinduism, however, it is the message that is primary.

Briefly, the *Ramayana* tells the story of the god Ram and his bride Sita. After a series of events, Sita is kidnapped by the demon god Ravana, who takes her to his fortress on Lanka. With the help of Hanuman, the monkey god, Ram is able to rescue her. However, even though she is still chaste, she has spent the night under another man's roof. When Ram is not convinced of her purity, Sita offers herself to the fires as proof of her devotion and faithfulness. Agni, the fire god, refuses to accept her, confirming her chastity. Nevertheless, her virtue continues to be the subject of gossip and rumor, until finally Ram leaves her, and Sita retires to a nunnery.

This story is popular for many reasons. The tale is so boundless that there are roles for everyone. For instance, Hanuman has an army of flying monkeys,

roles that are coveted by delighted children. The main characters are easily identifiable with the viewers. The plays are usually the climax of a grand festival, involving all participants. They can be huge events; the *Ramlilas* (reenactments of the epic) in Delhi may draw half a million people or more. But while bringing the religion away from its brahmanical roots and toward the masses, the *Ramayana* also preaches the importance of dharma. Even though she knows she is virtuous, Sita must go through the ritual of fire before she can be accepted. When Ram leaves her, she accepts his decision as part of her dharma. These messages promote the importance of following one's caste obligations without complaint.

The *Mahabharata* is a much larger work; composed of 18 books and 90,000 stanzas, it is both the largest depository of Hindu legend and the longest poem in the world. The *Mahabharata* tells the story of the Pandavas and the Kurus, two groups of cousins who fight for the control of Kurukshetra (see Chapter 2). After a series of events, the noble Pandavas, led by the brother Arjuna, are exiled from the kingdom for 12 years. Upon their return, the Kurus renege on the agreement, refusing to share the kingdom with their cousins. The culmination of the story occurs on the battleground of Kurukshetra, before the battle begins. This portion of the epic is known as the Bhagavad Gita (The Song of the Lord) and is arguably the most important piece of literature in Hinduism. The Gita tells the story of an exchange between Arjuna and his chariot driver, who reveals himself to be the god Krishna. Arjuna laments the fact that he is about to kill childhood friends and teachers. Krishna tells him not to grieve, for:

He who thinks this [soul] is the slayer
and he who thinks this is the slain
do not understand
it neither slays nor is slain. . . .
As a man puts off his worn out clothes
and puts on other new ones
so the embodied puts off worn out bodies
and goes to others that are new. . . .
To be born is certain death,
to the death, birth is certain
it is not right that you should sorrow
for what cannot be avoided
If you do not fight this just battle
you will fail in your own law
and in your honor
and you occur sin
(Basham 1959, 340–341)



Funeral ghats on the Ganges River at Varanasi (Banaras). (Alan Tobey)

Krishna thus spells out dharma: As long as Arjuna follows his caste duties as a kshatriya warrior, without giving thought to the fruits of his action, he will have completed his dharma. This fulfillment of selfless action is known as karma yoga, and indeed, the Pandavas won the battle.

Krishna also preaches to Arjuna the second lesson of the Gita: bhakti yoga, which is the fulfillment of one's dharma as a devotion to God. The practice of bhakti (whose rudimentary translation is "worship") allows for everyone's gift of devotion to be equal in the eyes of the Lord. Whether one is a dalit or a brahman, the offering of dharma is equal in the eyes of God. Bhakti makes brahmanic intervention obsolete; no longer do the lower castes and dalits need a priest to intercede. It brings about an equality previously unknown in the Vedic religion, yet at the same time it tightens the structure of the caste system. To offer one's devotion to God, one must stay within the boundaries of one's own caste. Regardless of treatment, or the foulness of the occupation, bhakti depends on acceptance without complaint, thus cementing the hierarchy. In terms of the land, lower castes often became completely dependent on the agrarian hierarchy, for while caste and class are not the same, they often combine to form power and wealth at the local level.

Religion thus plays a major role in South Asian perceptions of the link between humanity and nature. The Vedic religion introduced the gods of nature, who by definition were respected as the overseers of a stable natural world. The sanctity of the great rivers of North India is repeatedly declared in the Vedas, and the ideal final ritual for karmic ablution is to be cremated on the banks of the Ganges. Jainism introduced the concept of ahimsa, which included nonviolence toward nature and humans, while Buddhism spread vegetarianism and public works through the practices and encouragement of many of its practitioners. Hinduism brought institutionalized cow protection. Agrarian advancements may have played a role in the evolution of Hinduism as well. Occupational specialization certainly had an effect on how various Hindus interacted with the environment. These are but a few of the environmental consequences of spirituality in India.

THE DECLINE OF THE CLASSICAL PERIOD

The death of Chandra Gupta II in 415 coincided with the advent of attacks by groups from Central Asia. Of most import were the invasions by the Huns, who by the early sixth century had added Kashmir and the Punjab to their conquests. Although the later Guptas were able to stop their advance farther into India, the process destroyed the empire. With the Gupta focus to the northwest, Bengal, Orissa, and Assam declared their autonomy, as did states farther to the north. For almost half a century, a young ruler named Harsha Vardhana created an empire from Gujarat to Bengal, but his death in 647 led to a complete dissolution of the old North Indian empire. Although states in South India flourished during this period, there would be no general India-wide imperial success until the rise of the Mughals in the 16th century. The period in between saw a profound change in the social ecology of India, particularly with the birth of Islam and its introduction into South Asia.

We have spent much of our time in this chapter delving into the early religious traditions of South Asia, which may, on the surface, seem to have little to do with the environment of the subcontinent. However, we must keep in mind that our definition of environmental history focuses on the relationship between nature and society. All three religions—Hinduism, Buddhism, and Jainism—have an innate spiritualism that is deeply tied to humankind's surroundings. As should become increasingly clear in the chapters that follow, the composite structure and beliefs of the South Asian spiritual heritage had, and have, a profound effect on how different inhabitants of the subcontinent visualize and textualize their relationship with their environment.

IMPERIAL INTERLUDE

Traditionally, South Asian history has been written in political terms, with eras being defined by empires. Although this view may be helpful in constructing chronological “boxes,” it does us little good as a model for understanding the evolution of environmental history. We will discuss the weaknesses of this imperial motif more in the conclusion. For now, however, let us note that this view of history tends to ignore or denigrate division and regionalism, as if time stands still when empires fall apart. Yet regions often have the opportunity to form dynamic cultures and societies when they are out of the shadows of great empires. Indeed, historian Peter Robb has suggested that the equation should be turned around, in that empire should be seen as a response to weakened regionalism, rather than assuming an empire-centered model (Robb 2002, 53–54).

For our understanding of the relationship between environment and society, this new approach makes eminent sense. One of the tangential effects of imperial history has been to put North India at the center of change, while often leaving South India as a passive respondent to northern dominance. Yet the rise of South Indian kingdoms provides us with a remarkable model of how contests for regional control were shaped by pressure on the land and control of resources. As such, this chapter will look at the period from the decline of the Guptas to the rise of the Mughals in the 16th century in a slightly different manner, centralizing regional kingdoms in the south and then moving northward to follow the impact of the emergence of Islam in India.

It is tempting to describe the process of regionalism during this period as “feudalism.” Certainly this was a time that saw the rise of local as well as regional autonomy; pastoralism gave way to agricultural estates, farmed by peasants and overseen by local notables or religious figures. The era also saw the decline of some of the major urban areas. However, there is a danger in exporting this European concept wholesale to India. The Indian experience was defined by the ecological characteristics of the subcontinent, which varied vastly from those in the European feudal period. South India in the period after the decline of the Gupta Empire provides a keen example.

SOUTH INDIA

The South Indian peninsula is probably better defined by its large plateau than by high mountains and raging rivers. Although the area south of the Vindhya Mountains has many large rivers—the Narmada, the Godavari, and the Cauvery, to name but three—the region is comparatively arid and does not possess the kind of fertile land that we find in the Indo-Gangetic Plain. Furthermore, with the notable exclusion of the Narmada, virtually all of the great deltaic rivers in the south rise in the Vindhyas or Eastern Ghats and flow east into the Bay of Bengal, so control of the southeastern deltas has been crucial to establishing kingdoms in the peninsula. So, for instance, the eastern coastal areas of contemporary Andhra Pradesh and Tamil Nadu were contested well into the 19th century, as the British were still attempting to consolidate their authority.

The second southern area of contention was the contemporary state of Kerala, in the peninsular west. Although the southwestern section had several of its own rivers feeding into the Arabian Sea, it was not these features that attracted conquerors. These rivers flow from the young and therefore steep Western Ghats, directly into the sea. Consequently, they do not produce deltaic areas; because these rivers are very volatile, they carry their fertile silt directly to the sea rather than spreading it across the river banks or depositing it into deltas. Still, some tributaries of the major eastern rivers flow into the plains east of the mountains, and kingdoms arose along their fertile banks, across the plateaus of Kerala. There was a constant desire, however, to gain control of these rivers at their sources; battles over the Godavari, Krishna, Cauvery, and Vaigai deltas were continuous, and control changed hands throughout the period.

Environment also helped dictate the size of kingdoms. The great early empires of the north dominated the Indo-Gangetic Plains; they were able to establish agrarian-based empires across the swath of North India because of the vast, fertile plains. However, kingdoms in the south were limited by the size of their deltas and fertile plains. As such, feudal-like regional kingdoms were a practical solution to the environment these rulers encountered in their attempts to control the deltas and plateaus of South India.

In the immediate aftermath of Gupta decline, four dynasties vied for control of the peninsula: the Chalukya in Kerala to the west; the Pallava of contemporary Tamil Nadu; the Chola, which had its capital in Thanjavur in the Cauvery River delta; and the Pandya of Madurai in the far southern tip of India. These four kingdoms claimed sovereign regional control (waxing and waning though it was) from the 6th through the 13th centuries. These families cannot be credited, however, with forming cohesive, long-term territorial control of South India; because of the climate and landscape, these powerful families were constantly

competing for water resources and arable lands. A brief look at the permeability of the four kingdoms gives us a sense of the changing political scene in medieval South India, and it will also help us in understanding the development of a unique cultivation system in the peninsula.

Beginning in the middle of the sixth century, the Chalukya moved south, seizing control of the Krishna River in Karnataka, and building their capital city of Badami just south of the river. As they attempted to move farther east they were met by the Pallava, who defeated the Chalukya in 642, giving the Pallava control of Badami. Within a little more than two centuries, the Pallava were conquered by the Chola, who formed the largest and longest lasting of the medieval kingdoms. At its height, the Chola kingdom stretched from Kerala to Tamil Nadu and included Sri Lanka. By 1223, however, the Pandya had regained control and reestablished their kingdom in Madurai. Competition among the families continued until many were absorbed into the great kingdom of Vijayanagar, beginning in the 14th century.

The purpose of this brief history is not to drown the reader in detail, but rather to suggest that, given the constant feuding, local control by religious and political elite provided more stability than did control by the regional powers. With the distinct environmental characteristics that made competition and control of water essential, South India was defined more by who controlled the agrarian necessities than by who was king at any given moment.

AGRARIAN PRACTICES IN SOUTH INDIA

As we have noted, the most desirable areas for cultivation, and consequently the greatest sources of conflict, were the deltas, primarily those of the Godavari, Krishna, and Cauvery rivers. These fertile areas provided rich crops but could only supply a limited number of cultivators. The interior regions of the peninsula, on the other hand, demanded irrigation. Throughout the interior peninsula, the landscape became dotted with tanks, reservoirs, sluices, wells, and canals. Two aspects of this type of irrigation need our attention: irrigation in relatively dry regions is extremely labor intensive, and whoever controls the water also controls its distribution, and thus has life-and-death control over the cultivators.

Regardless of who controlled the land, local knowledge was crucial. Peasants were thus the nuclei of the system, not only in terms of labor but also for their knowledge of practical modes of irrigation in their specific regions. This in part explains the agrarian order in the earliest centuries of this period in South Indian history. Power was levied at the local level, where villages were divided into two

categories: the brahmadeya, which were villages given as gifts to the local priests, and the communal (later known as *periyanaadu*) villages, which were administered by the cultivators themselves. The brahmadeya villages were a collection of tax-free individual holdings, owned by the various brahmins, who, by caste definition, could not till their own lands. In these villages there developed a distinct two-class agrarian system. Irrigation works were controlled by the brahmins but were built by landless and low-caste laborers. Canals, reservoirs, and wells all had to be dug for the land controllers. If peasants were reluctant to carry out the labor, *corvee* was introduced; some became bonded laborers. Peasants were then required to cultivate the brahmin lands. In the brahmadeya villages these cultivators were in effect landless laborers, who were usually given a small portion of the crops they grew. In the communal villages, however, the peasant was cultivator, laborer, and administrator in one. While the dominant peasant caste may have controlled the village assembly, the land was owned by the community as a whole. The cultivators provided food, revenue, and taxes, which were distributed by the assembly. As irrigation became more entrenched over time, however, communal ownership began to disappear in places. By the time of the later Chola, individual ownership of large tracts appeared in many regions. We may speculate that privatization occurred in part because of brahmin control of irrigation works. By denying water to communal villages, peasants may have been forced to turn control of their lands over to brahmadeya villages to survive. Moreover, there is a historical pattern of elite control of irrigation works coinciding with repression against the laboring classes. We need to look at the options open to the peasantry as the hydraulic system in South India became increasingly repressive for many of them (Stein 1998, 129–134; Stein 1980, chapter 6).

PEASANT OPTIONS IN HYDRAULIC SOUTH INDIA

Before we turn to peasant reactions to oppression, we need to briefly analyze the administrative infrastructure to understand what options were open to the cultivator. With the caveat that we must not make generalities for all South India, the Tamil kingdom of the later Cholas (ca. 950–1100) provides a good example of South Indian kingdoms in the period leading up to Muslim expansion into the peninsula.

The late historian Burton Stein, during a lifetime spent studying South Indian agrarian structures, was an early advocate for jettisoning traditional concepts of “empires” and “kingdoms” to better understand state formations in medieval South India (Stein 1980). He argued that rather than describing the

peninsula as a series of well-defined kingdoms competing for control of scarce resources, we should instead look at them as "segmentary states." Within these states there were two forms of sovereignty. The first was ritual, that is, the symbolic sovereignty of the king as head of state. Actual political sovereignty, however, was dispersed throughout various regions or zones. These zones were organized in a pyramidal fashion; in other words, each zone's political structure was a miniaturized copy of that of the ritual center. In this way the political zones were linked to the state apparatus, while still maintaining a large degree of autonomy. In this model, significantly, the regional power is free to develop an agrarian hierarchy of his own choosing, be it flexible or oppressive. It is here that peasant options, in the light of repression, become germane.

Peasant responses within the agrarian hierarchy may best be understood under the umbrella of "the moral economy of the peasant." A term popularized by the political scientist James C. Scott, it describes the relationship between the cultivator and land controller in semiautonomous states like those found in medieval South India (J. Scott 1976). The foundation of peasant existence is constant risk. For the peasant, life or death depends on the environment. Drought, flood, natural disasters, and insect infestations can all lead to massive famine and consequent starvation. In addition to these, land controller-peasant interaction may also make the difference between survival and extinction. As most cultivators worked for a percentage of the crop, any arbitrary lowering of their portion could result in disaster.

Contrary to popular perception, Indian peasants are not passive creatures, accepting their hardships as karma, about which nothing can be done. They know they need to bring in enough crops each year for the landlord's revenue demands, their own household needs such as food and shelter, and a few outside necessities such as cloth and salt. They also know they walk the tightrope between starvation and subsistence. As such, the peasants actively try to avoid risk as much as possible.

Here the model of the moral economy is applied; it is a reciprocal relationship between the cultivator and those with power over him. In return for annually supplying the revenue demanded by the state and land controller, the peasant expects to receive economic justice. Justice is measured in terms of exploitation. As long as the demands of the village and state bureaucracy leave the cultivator with enough for subsistence, these demands are considered legitimate. In return, however, the peasantry expects protection, justice, and crucially, a means for survival in times of famine. The village authorities, and by extension the state, are expected to set aside a percentage of the revenue for times of scarcity.

If the peasant is exploited, is overworked, or faces starvation, what are his options? To borrow from the economist Albert O. Hirschman, his possibilities



Cattle draw water from a well near Kerala, India. (Galen Frysinger)

fall into three categories: exit, voice, and loyalty (Hirschman 1970). He may remain loyal, in the hope that he will be rewarded for staying faithful to the land controller while others around him were not. He may voice his complaint, either by petition, protest, or, in the extreme, rebellion. His final option is to desert his land. While at first glance this might seem a desperate response on the part of the cultivator, in fact, in medieval times it was his most powerful weapon. As long as there was more arable land than there were people to cultivate it, the peasant's productive capacities were highly valued, so the threat of desertion put the landlord in the position of returning to a nonoppressive relationship or leaving cultivable land fallow. Indeed, the peasant had the opportunity to sell his services to the highest bidder.

While we need to be careful not to romanticize the peasant's condition, there was a certain flexibility in the precolonial period. Because the peasant received a portion of the share, even in times of famine he received some crops. As long as there was surplus land, the peasant had the ability to move to another estate if the oppression became too great. As a result, peasant rebellions were rare during this period. When the surplus land disappeared because of population growth, so too did the peasant's greatest weapon. It was now the land controller who could rack-rent the peasant, ignoring the margin of scarcity. If the cultivator complained, he could simply be replaced by a landless laborer who was willing to take a chance on survival. As we shall see, when this loss of options is combined with a change to cash rents and a colonial belief in the infallibility of the free market, famine will become common, as will peasant insurrection.

VIJAYANAGAR

In spite of the flexibility found in the patron-client relationship, the reciprocity entailed within could not survive a prolonged period of drought and famine such as the one that befell vast regions of the subcontinent from 1335 to 1342. The famine was particularly devastating in the southwest region of Karnataka. Without deltas and with a low rainfall, insurgency was strong in this area, particularly among the warrior groups. With the competition for water being so fierce, and with long stretches of drought appearing annually, the regional agrarian hierarchy included large numbers of warriors (in part to protect or capture water supplies) as well as cultivators. Taking advantage of constant regional battles, and an ensuing invasion from the north by the Muslim Sultan Muhammad Tughluq, a group of warriors proclaimed the formation of a new kingdom called Vijayanagar, which means "City of Victory."



Ruins of the kingdom of Vijayanagar on the Tungabhadra River. (Francesco Venturi/Corbis)

As is often the case, the story of the founders of Vijayanagar is a combination of fact and myth. We know that the kingdom was established by two brothers, Harihara and Bukka, who were the sons of the ruler of Kampili, located on the Tungabhadra River. The brothers were taken prisoner by the forces of Muhammad Tughluq and sent to Delhi where, legend has it, they converted to Islam. The brothers were experienced horsemen and soldiers; consequently, in 1336 they were sent back to Kampili by the sultan, to rule in his name. Instead, under the influence of the famed philosopher and guru Vidyaranya, they reconverted to Hinduism and proclaimed the new kingdom of Vijayanagar, which they dedicated to the protection of Shiva and other Hindu gods.

For the reasons noted, Vijayanagar has often been defined as a Hindu kingdom, but this is too simplistic an interpretation. Certainly the brothers used the symbolism of the religion; major temples dotted the kingdom, and the kingdom held a religious investiture every year. They also made certain that regional religious icons were incorporated into the inner sanctum of deities acclaimed by the royalty. At the same time, however, the kingdom adopted weapons from the

Portuguese (who gained control of the adjacent island of Goa in 1510). In the later era Vijayanagar built numerous mosques for the Muslim cavalry whom they recruited to fight for them (Stein 1989, 29).

One of the major reasons for local stability was the rulers' relationship with the landlords. The early kings replaced the traditional elite with a bureaucratic hierarchy that was dominated by brahmans from the top administrators down to the revenue collectors, but they left the land under the direct control of the traditional landholders. As such, the traditional system involving the moral economy of the peasant remained intact. Furthermore, they introduced an important practice that would be carried on throughout the Mughal and British empires: The kingdom offered incentives to peasants to cultivate land that had been newly reclaimed from the forests. As population increases coincided with increased deforestation, this practice became one of the tail wagging the dog: as land became more scarce, deforestation and jungle clearance provided an economic opportunity for the landless. During the British Raj this practice reached its apex; only after the disastrous environmental and economic impacts of massive deforestation were realized did the government introduce an Imperial Forest Service in 1867 to oversee silviculture.

That Vijayanagar lasted as an independent state for more than two centuries is in itself a notable accomplishment. The kingdom was under constant siege; the Delhi Sultanate saw Vijayanagar as the nucleus for any possible attempt to end Muslim rule in India. The more the kingdom displayed its Hinduism, the more it became a thorn in the side of the Sultanate. It also faced attack by non-Muslim forces, such as the kingdom of Orissa. Finally, it was often weakened by that bane to a smooth transfer of power: the absence of primogeniture. With no smooth transition from father to eldest son, fratricide and civil war were constant impediments to imperial legitimacy and control. By 1565 (ironically well after the fall of the Delhi Sultanate), all of these tribulations had fatally weakened the kingdom. At the Battle of Talikota, on the banks of the Krishna River, Vijayanagar was defeated by a coalition of five surrounding Muslim successor states; the capital city was sacked and partially destroyed. Yet in spite of all these hazards, at its height Vijayanagar's control extended to the Krishna River and beyond; it controlled Goa and received tribute from Ceylon. It played a rich and dynamic, albeit often overlooked, role in the environmental history of medieval India (Stein 1989, 109–140).

As we have seen in this section, South India's history and culture in this period had a great impact on the environmental evolution of the peninsula. Irrigation canals, reservoirs, and tanks began to dot the landscape. Rivers were dammed and channeled with new technology that was supremely sophisticated

for its time and place. Deforestation led to new cropping opportunities. Although much changed, peasants still had options in terms of resisting repression and receiving justice from an agrarian hierarchy. In short, South India's terrain underwent a dramatic overhaul. North India experienced a similar transition, but under different circumstances. From the eighth century forward, Islam, with its distinct religious ethos, began to permeate North Indian beliefs, values, and culture. Among the variants that entered India were changed perceptions of the relationship between humankind and the environment. As such, it will be helpful to outline the basic tenets of the religion in order to comprehend any new or different responses regarding that relationship.

ISLAM

Islam means "submission [to God]." As with all religions, its creed is tied to the culture in which it developed. The Prophet Muhammad (570–632), a merchant in the Arabian Peninsula, became increasingly disillusioned with the commercialism and paganism that had replaced the spiritualism of the Abrahamic traditions of the region. At the age of 40 he received a series of revelations from the archangel Gabriel, the collection of which are known as the Koran. Muhammad then began preaching across Arabia, advocating loyalty based on spiritual rather than tribal ties, a return to the values and morality of the books of Judeo-Christianity, and, especially, absolute monotheism. By the time of the Prophet's death, the vast majority of the Arabian population had converted to Islam.

With Muhammad's death, tensions emerged within the Muslim community over a successor. Although a few argued that there should be no successor at all to the Prophet, in general the leaders of the community divided into two camps: those who believed the successor should be chosen from among the leaders of the community and those who believed he should be related to the Prophet. The first group chose as their leader, or khalif, Abu Bakr, a companion of the Prophet and a respected leader of the community. The second group demanded the selection of Muhammad's cousin and son-in-law, Ali. Eventually this disagreement over the succession led to an irrevocable split, with the Sunni ("followers of the custom") condemning the Shia (from Shiat Ali—"followers of Ali") as heretics for suggesting that the descendants of the Prophet had a divine right to rule, thus giving them supernatural characteristics that denied the absolute divinity of God and God alone. Today, the Shia are a majority in Iran and Iraq and are found in pockets across South Asia. The Sunni form the dominant branch of the religion.

In spite of this split, the basic beliefs and practices of the two groups are similar. Muslims believe in all the books revealed to all the prophets from Adam to Muhammad; they believe that, while not the son of God, Jesus was nonetheless a great prophet. Over the centuries, however, the old tradition had become corrupted; the practice of saintly devotionism, for example, had led Christians away from monotheism. Thus, Gabriel had delivered to Muhammad the final revelations of the true religion.

Muslims are guided by religious law known as the sharia, which is based on the Koran and examples from the life of the Prophet. The law is interpreted by the ulema, or the knowledgeable of the community; in Sunni Islam there is no established clergy. Rather, children are chosen at a very early age to study the holy books, law, and practices of Islam until each becomes accepted by his community as an alim, or "learned one."

Other practices include abstaining from alcohol and drugs. Because idolatry was practiced widely until the time of the Prophet, portraits of human images are discouraged, for they may lead to hero worship. Conversion was essential to early Islam and was based on Old Testament principles of conversion or death. However, dhimmi, or "people of the book," were excluded; in return for paying a head tax known as jizya, Jews and Christians were protected.

The Sufis were instrumental to conversions in South Asia. Sufism is the mystic tradition found in Islam. Sufis stress God's love rather than his wrath and seek a personal union with God. In this they have much in common with the bhakti movement in Hinduism, and during Islamic rule they were accepted throughout much of India where the orthodox ulema were not. In India they formed themselves into associations, known as *silsillahs*, usually led by a pir, or Sufi saint. Because of their belief in saints and the possibility of a mystical, individual relationship with God, they were often in conflict with the traditional religious leaders. Nonetheless, they had a great influence in India.

In general, then, Muslims, by following the tenets and laws of Islam, live a peaceful and prosperous life. A believer practices the Five Pillars, follows the dictums of the respected community leaders, and adheres to the rules that guide behavior, justice, and equality within the community. The Islamic community is the central nucleus of a given geographic area, and it must be protected, by jihad, or holy war, if necessary. Above all a Muslim must avoid *shirk*, or denying the oneness of God. *Shirk* leads to the fiery hell of the Old Testament. But if one is faithful, one will have led a happy life and go to heaven. The Koran tells Muslims that "you have become the best community raised for mankind, enjoying the right and forbidding the wrong, and having faith in God" (Koran 3:110). This is the aspiration for all followers of Islam.

ISLAM AND ECOLOGY

Islam's impact on India will occupy many portions of the rest of this book, not only in terms of culture, religion, and politics, but ecologically as well. The height of Islamic control of India paralleled a period of profound environmental change unlike anything seen in a millennium. As such, we need first to examine the relationship between the religion and the environment.

In 1967, the historian Lynn White, Jr., published a short essay in the journal *Science*, entitled "The Historical Roots of our Ecological Crisis"; some scholars see this article as the founding work of environmental history in the United States. In this piece White argued that the source of environmental degradation could be found in the Bible. He based his thesis on the creation story, arguing that the Abrahamic religions were the most anthropocentric religions on earth. God not only created man last, he also told man to name all the beasts and to have dominion over them. Furthermore, the world of the Judeo-Christian-Islamic tradition was finite; the world began as described in Genesis and will end with the Apocalypse. Since time was linear and had a definite beginning and end, there was no need to conserve resources because they would be extinguished at the end of the world anyway. Certainly in the early days of Christianity (as well as Islam), the day of judgment was deemed to be just around the corner. Thus, environmental degradation was of no consequence. Nature lost any intrinsic value and became only a commodity. White juxtaposes this tradition with those of Asian religions that believe in reincarnation and see time as circular. These societies, he argues, have preserved their environments because they believe they will return in another life. The gauntlet had been thrown.

Naturally enough, Muslim scholars have decried White's thesis. Responding directly to White's contentions, Islamic authors Atiya and Irshaad Hussain argued that Islam cannot be seen in the same light as Christianity, because the fundamental principle of Islam is the oneness of God, whereas to Muslims the Christian idea of the Trinity is polytheistic. Because everything emanates from God, everything has a design and a function. Although man may have been raised above the rest of God's creations, he has been given a trust over nature. And because nature originates from the Divine, the Hussains argue, man has a spiritual obligation to protect nature (Hussain 1991).

Certainly there are problems with White's argument, particularly as it pertains to South Asia. Fundamentally, White's suggestion that the indigenous religions respect nature more than the monotheistic ones is not borne out by the facts. India today has some of the most polluted rivers and cities in the world (as does China, for that matter). While on an individual basis there may be a heightened respect for the environment, nationally this has not been the case.

Nor is the Hussains' thesis validated by the light of human action. While their theological defense may very well be true in the abstract, in practice there is little difference in the environmental policies of predominately Hindu India and predominately Muslim Pakistan. This would suggest that science, technology, and capitalism were more essential catalysts for the expanded degradation of the environment than were religions. Indeed, the Hussains conclude their argument by noting that both the roots and the resolution of human attitudes toward nature are inherently tied to an individual's view of his or her responsibility in the hierarchy of creation; one may justify either exploitation or preservation of nature by one's biblical interpretation. That being noted, there was nonetheless in South Asia a great change in society, politics, and the environment that coincided with Muslim rule, cresting from 1200 to 1700, but beginning in the eighth century when the first extended contact between South Asians and Arabs took place on Indian soil.

THE ADVENT OF ISLAM

As we have seen, trade between peninsular India and Arabia had been carried out for centuries before the birth of Islam. With the Islamic injunction to carry out conversions throughout the world, Arab conquests of West Asia brought both the people and religion closer to North India. In the seventh century, tension arising from trade and piracy led to a short-term invasion of Sind. It was not until 711, however, that any lengthy occupation of South Asia occurred, when the governor of Iraq sent his armies against the forces of the raja of Sind. He established Arab control over Sind and parts of Punjab for well over a century, until a major earthquake wiped out both cities and agricultural lands, weakening external control and allowing local governors to rule independently. When Islamic power was again established from abroad, it came over the mountains rather than across the sea.

By the beginning of the 11th century, there were several small Islamic states across West and Central Asia, whose armies included Mamluks, primarily from Central Asia, in the officer ranks. Mamluks were slaves, in the sense that they had been bought and were the property of the ruler. However, as they were usually purchased around the age of six, and spent their entire youth in military training, many rose rapidly into positions of power. Such a slave general, Alptegin, rebelled against his Persian master in 962 and formed the kingdom of Ghazni, whose capital was in contemporary central Afghanistan. His son, Mahmud, knew of the riches of India, and in 1000 began the first of many annual campaigns of plunder and destruction into Northwest India, eventually reaching as far east

as the Punjab. The Ghaznavids made no attempt to establish themselves in India, however; they were solely interested in destroying Hindu and Buddhist places of worship and returning home with their plunder.

The relationship between Islamic West Asia and South Asia changed in 1151 when Ghazni was superseded by the kingdom of Ghuri in western Afghanistan. The ruler, Muhammad Ghuri, wanted more than riches from India; he was determined to incorporate it into his empire. Beginning in 1173, he moved across the Indus Valley, capturing the cities of Peshawar and Lahore. When he finally conquered Delhi in 1193, the Gangetic Plain was open to his forces. Led by the slave general Qutbuddin Aibek, Ghurid forces moved across North India, capturing Bihar and Bengal (in the process destroying the great Buddhist university at Nalanda), even briefly attempting to take Assam in the far northeast corner of India. The conquest took its toll, however; when the armies headed east, revolt began to percolate in the heartland of Ghuri itself. In 1205 Muhammad was forced to return home, leaving as his viceroy the slave general Aibek. When Muhammad Ghuri was assassinated the following year, Qutbuddin promptly declared his independence from Ghuri, establishing the Delhi Sultanate, the first continuous Islamic regime in South Asia.

THE DELHI SULTANATE

Two major events, both of which were crucial to the changing environment of South Asia, occurred in 1206. One was the ascendancy of Genghis Khan as the ruler of Mongolia and the subsequent Mongol invasions of Asia and Europe. The other was the establishment of the Delhi Sultanate.

In many ways, it is remarkable that the Sultanate lasted for almost two centuries; while dynastic families changed (during the height of the Sultanate, first the Khalji and then the Tughluq sultans ruled), control of India grew, reaching its apex in the middle of the 14th century, when Muhammad Tughluq briefly expanded control to Madurai in the far south. Consider the difficulties they faced: The regime, while equipped with very able warriors, was minute compared with the forces of the combined rajas of North India, let alone those in the south. The conquerors faced a vast population of Hindus and Buddhists, who, under the Islamic scriptures, were to be converted or killed. They had no central administration to inherit and little sense of the revenue systems, which varied from one kingdom to another. They knew little about the environment of the subcontinent, and that which they did begin to know (particularly the farther south they went), they hated. Indeed, one of the ironies of the Sultanate lay in the fact that they were forced to stay in India; the Mongols had gained control of Central Asia,

and blocked any routes leading back to the traditional homeland in Afghanistan. Given all these challenges, it is particularly impressive that by the end of the Sultanate, neither Islam nor Muslim rule were considered to be foreign interlopers.

The most immediate issue facing the new rulers was their relationship with its non-Muslim population. Here we find one of the first examples of blending pragmatism with spiritual obligation. Because Hinduism had the Vedas as the basis for the religion, the Sultanate ruled that Hindus were people of the book. Although many of the ulema objected vociferously to this designation, it proved beneficial in several ways. It obviated the necessity of leading a campaign of mass forced conversion or slaughter. It also provided the bulk of the revenue, as dhimmi were ordered to pay *jizya*, the head tax for protection. This tax, along with the tithe required from Muslims and the land tax, provided enough revenue for expansion as well as administration. Buddhists however, were not protected, and they either converted, migrated, or were massacred, which partially explains the very small Buddhist population in the country of Buddha's enlightenment.

Governance was adapted from the Ghuri example, with a hierarchy of royalty and rank based on ethnicity: pure-blooded Turks were followed by Afghans, and South Asian Muslim converts were at the bottom. Nonetheless there were real possibilities for advancement for Muslim converts. If they were ambitious and capable, they could rise to join the military elite, as did Malik Kafir, a convert who rose to be head of the army under the Khalji. This again was a pragmatic decision, for it encouraged conversion while at the same time providing needed troops and officers. For similar reasons Sufi mystics were encouraged to migrate east and south. They found receptive audiences in Bengal and in the central peninsula, where the Islamic emphasis on equality was particularly popular with the low castes and untouchables.

Conversion also played a role in the ultimate downfall of the Sultanate's central power over the majority of India. By the end of the 14th century, the regime faced a conundrum that occurred throughout the premodern period: the more successful the Sultanate was, the more difficult it became to control its peripheral territories. In an age of slow transportation and communication, it was much simpler for an ambitious regional governor or general to break away from the center, particularly in times of perceived weakness. In the case of the Sultanate, the existing South Indian kingdoms encouraged such autonomy. To combat this, and to expedite conversions, in 1327 Muhammad Tughluq moved the capital south from Delhi to Deogiri in Maharashtra, renaming the city Daulatabad. The move turned into a disaster. The nobility hated the environment; the heat overwhelmed them. The cost of the move and the expenses of maintaining



Qutab Minar, located in Delhi, is one of the architectural masterpieces of the Delhi Sultanate. (Ron Sumners)

two imperial cities led to an enormous increase in taxation. Land revenue rose to 50 percent of the grain, which Muhammad then demanded be paid in cash rather than in kind. To this end he introduced token currency, whose face value was worth more than the copper used to make the coins. This led to massive counterfeiting, inflation, and rebellion in the north, where nobles took advantage of the vacuum left by the removal of the capital. By the time of Muhammad's death in 1351, the Sultanate was disintegrating, although it survived weakly until the sacking of Delhi by the infamous Central Asian warrior Tamerlane in 1398.

The Sultanate's legacy in India is deep. By the end of the 14th century, Islam was an established religion in South Asia. Although the Tughluqs' attempt to control South India may have ultimately been futile, the central Indian state of Hyderabad was to become the Islamic nucleus of South India, and its Muslim population played a major role in the development of Indo-Islamic art and architecture. Of equal significance, the revenue and administrative systems developed by the Sultanate provided the roots for an agrarian system that existed until independence. As the agrarian system was expanded and modified by Sher Shah Suri, the Mughals, and the British in particular, the relationship between the peasant and his environment became ever more tenuous, and those repercussions can be felt across India today.

ENVIRONMENTAL CHANGE IN MEDIEVAL INDIA

To clarify the relationship between people and the land in a peasant society, it is worth quoting the agrarian historian David Ludden, who eloquently explains that

The long history of agriculture is of countless ecological interventions that have given nature its civility, and imparted personality to the land, as people have cut down forests, diversified rivers, built lakes, killed predators, tamed, bred, and slaughtered animals, and burnt, dug, and axed natural growth to replace it with things that people desire. Farming occurs in a land of emotion, and agrarian territories need gods, poetry, ritual, architecture, outsiders, frontiers, myths, borderlands, landmarks, and families, which give farming meaning and purpose. (Ludden 1999, 60)

Ludden's emphasis on emotion is particularly pertinent for our study, for it helps in part to explain the incentive behind peasant insurrection, which will be a common theme from the 18th century forward. Emotion and self-preservation were also catalysts for the dramatic changes in the first half of the second millennium, caused by that most emotional occurrence of all—war.

As we noted earlier, in 1206 Genghis Khan and his forces began to move west into West Asia and on to East Europe. As they moved, their ferocity and viciousness preceded them, leading to mass migration into South Asia; this phenomenon continued for about five centuries, long after the Mongol threat had abated. While many moved into urban centers, depending on their crafts, the majority attempted to settle on the land. Some of these would-be peasants were unwelcome; they were not part of the local agrarian society and did not have caste affiliations. Some migrants attempted to cultivate fallow land, while others retreated to the sanctuary of forests and jungles that had traditionally provided refuge to the outcaste. This phenomenon turned the disenfranchised into social bandits, leading to constant struggle at the local level for land and crops.

In addition, this era produced almost constant warfare, between the Sultanate and regional kingdoms, or contenders for a throne, or among the regional kingdoms themselves. The effect on the environment was destructive and permanent. Forests and jungles were particularly vulnerable. As in mythology throughout the world, forests were often seen as the home of evil spirits and witches, as well as outcastes and dacoits (thieves). They were filled with disease and harbored dangerous animals. In wartime they also provided safe haven for spies; larger woodlands could even hide armies. They also made movement difficult, forcing large military units to find longer routes to strategic areas. The solution, of course, was to destroy them. This in turn led to the destruction of peasant holdings by wild animals that no longer had a source of sustenance and to land-grabbing by the forest dwellers. Boundaries were constantly changing, villages would disappear and reappear, land possession shifted from one group to the next, and, with remarkable speed, forests and jungles would reappear. Often the whole process would repeat itself at this point. Decades of such ecological warfare often made the land uncultivable for ages.

With uncultivable land speckling South Asia, and with the demands of armies, who were usually paid by plunder and simply took the supplies they needed, famine became a recurring problem. The historian Sumit Guha quotes a traditional account of a famine in Maharashtra that lasted from 1396 to 1408 and affected cultivation for decades: "For twelve years famine fell upon the earth, the grazier folk rose everywhere, from that year until [1438] . . . for thirty years the graziers ruled. . . ." (S. Guha 1999, 48). Apparently the insurrection lasted until the regional leader stabilized the agrarian economy by fixing specific divisional boundaries, measuring the land, and settling the revenue payments.

Warfare also ruined the land by destroying irrigation systems and water supplies as a means of strategy. Ludden details a case in the contemporary state of Madhya Pradesh in which the sultan of Mandi cut a dam near Bhopal, thus draining the great reservoir within and destroying the entire irrigation system. As he

notes, such actions made investment in agrarian infrastructure highly risky, exacerbating the instability of agriculture and often contributing to an increase in famine (Ludden 1999, 91).

THE TRANSITION FROM MEDIEVAL TO EARLY MODERN

By the end of the 15th century, as we begin to enter early modern India, nature had been under siege for centuries. As the population of South Asia increased, more forests and jungles were cleared for cultivation; other areas were deforested due to war and for purposes of security. While innovative irrigation works (particularly in South India and Ceylon) extended cultivation, they were often destroyed in contests for control. In general, it was a period of constant change, both socially and ecologically. The period between the sacking of Delhi and the establishment of the Mughal Empire, while one of regional autonomy, was also one of warfare and expansion, carrying with it further incidents of famine and environmental devastation.

Although the environment certainly changed radically in medieval India, it would be wrong to suggest that a concerted campaign to subdue nature and her inhabitants was carried out. Rather, the changes were a result of a period of constant flux more than a sense of determined mastery of the forests, rivers, and jungles. Regional short-term autonomy tended to lead to hasty and temporary economic planning, which ignored the long-term future of the environment. Perhaps the one exception to this trend was the brief five-year rule of Sher Shah Suri, who took advantage of a weak early Mughal ruler to take control of the Indo-Gangetic Plain from 1540 to 1545. Following in the footsteps of the great Mauryan emperor Ashoka, Sher Shah was a strong supporter of public works. He built a series of great roads, including one that stretched from Sonargaon in contemporary Bangladesh to the Indus River. He established rest areas, with wells and trees for shade, every four miles along the major roads. There were separate eating facilities for Hindus and Muslims, so all would feel welcome. Of great long-term consequence for our study, Sher Shah's administrative reforms provided the prototype for the Mughal and British agrarian systems. Although his rule was short, his legacy was great. Unfortunately, Sher Shah Suri was the exception to the typical autonomous ruler.

The relationship between humanity and nature and, significantly, the perception of that connection began to change in the 16th and 17th centuries. In part this was due to a period of relative stability across much of the subcontinent. This allowed for a return to steady pastoralism and farming, as well as the long-term establishment of the technical works needed to sustain such a system. Of

equal importance, under the leadership of the great Mughal emperor Akbar, it led to the revamping of the revenue system along the lines introduced by Sher Shah. These changes directly affected the cultivator and his land. As we shall see, the Mughal agrarian system would also provide justification to colonial administrators, with their mantra of free trade, to privatize agriculture in North India, further alienating the peasant from his land while commodifying his production.

THE RISE AND FALL OF THE MUGHAL EMPIRE

The Mughal Empire composed the third leg of the great Muslim imperial tripod of the early modern era. If the Ottoman Empire provided the symbolic leadership of the Islamic world (in the form of the khalif), and the Persian Empire produced the language of diplomacy and literature for it, the Mughals represented Islamic grandeur. The Taj Mahal, the Peacock Throne, Mughal gardens, and miniature paintings all came to represent the opulence of the “Orient” in the eyes of the West. Although it is true that the height of the Mughal regime coincided with profligate spending and construction, the empire was not the representation of “oriental despotism” that 19th- and early 20th-century European historians portrayed it to be. The Mughal legacy included the introduction of a centralized agrarian and administrative system that allowed the empire to expand to borders not seen since the days of Ashoka. The era also became a bridge between the medieval period and the modern age, both in India and the world. Thus, the commercialization of nature, the introduction (sometimes forced) of new cash crops, and the rise of the trading class all became actively encouraged and officially promoted by the Mughals, along with the subsequent environmental consequences that come to be associated with such changes. By the end of the Mughal Empire, India was no longer a regional partner in an Asian trading network; it was part and parcel of the emerging global market economy.

The founder of the empire, Babur, had a lineage that could frighten the strongest warrior: he was a descendant of Genghis Khan on his mother’s side and Tamurlane on his father’s. Babur had little love for the Mongols, but he was happy to use his roots for a strategic advantage, so much so that the name of the empire was a corruption of “Mongol.” At the age of 10 Babur inherited his father’s small kingdom in Uzbekistan, but he was soon driven out, settling instead in Kabul, Afghanistan. Constant tribal warfare in Central Asia, combined with the political disintegration that followed his ancestor Tamurlane’s sack of Delhi, made India increasingly attractive to Babur. After numerous incursions into northwest India, he captured Lahore in 1524, setting up a confrontation with

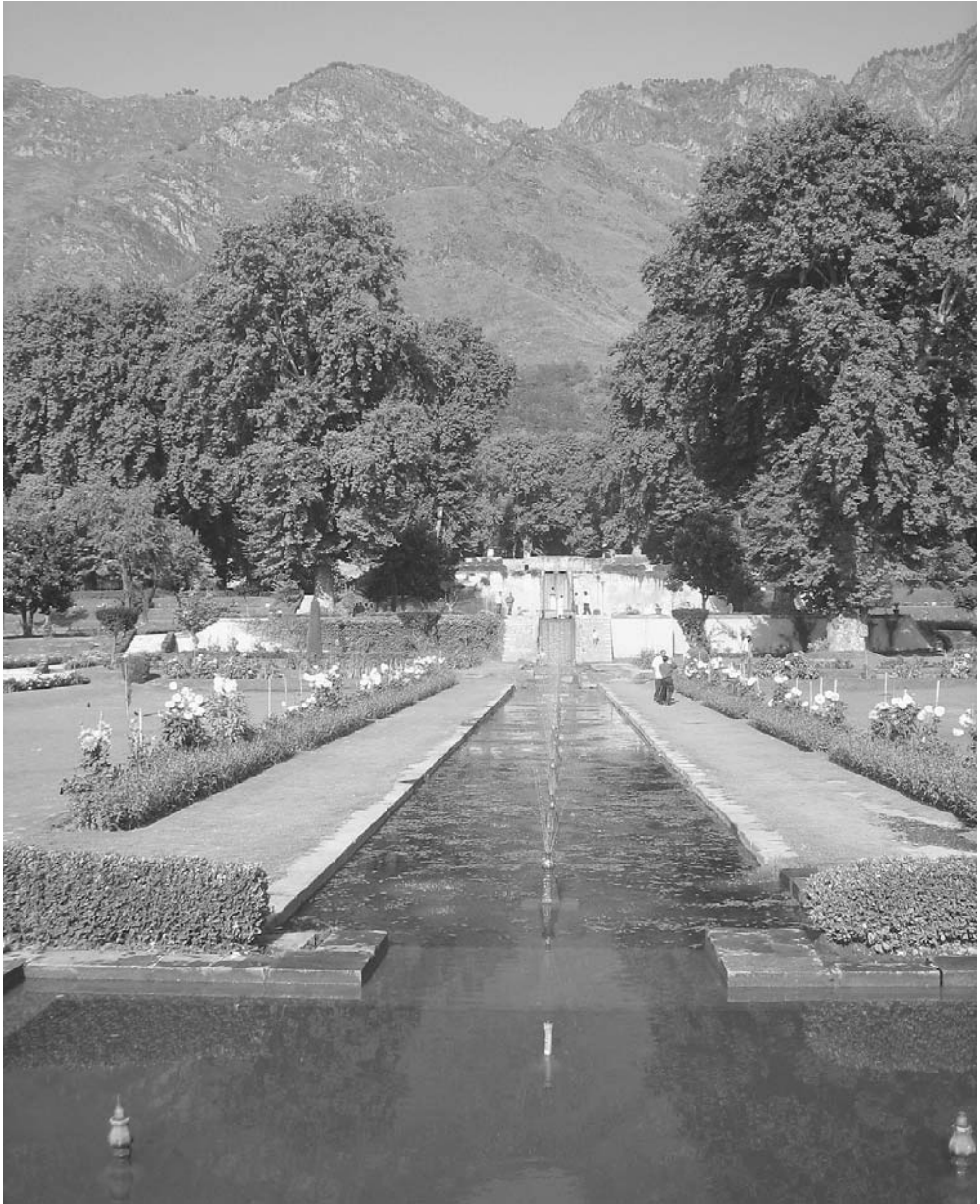
the Lodis, who had taken control of Delhi after its sacking. The Battle of Panipat (once again on the plains north of Delhi) was a conclusive victory for Babur, and in 1526 he established his capital in Delhi.

For the next three years, Babur's armies swept across North India, first conquering the Rajputs and then gaining victory over the Afghans who controlled Bengal. Within three years, the Mughals controlled the breadbasket of South Asia. Unfortunately, Babur died too soon to establish a cohesive administrative system based on bureaucracy rather than the force of his character. When he died in 1530, however, he left behind an aesthetic sense that still resonates in India.

Babur was forthright in his dislike of India; he found it hot, dusty, and ugly, and he and his nobles became homesick. To combat this he began the practice of building gardens in his capital cities. The famous Mughal gardens in Lahore, Delhi, Agra, Kashmir, and Fatehpur Sikri were reminders of the cool breezes and fragrant flora of Kabul. Each garden was designed to resemble the imperial imagination of the Garden of Eden, or a reflection of heaven. As noted by Niccolao Manucci, an Italian adventurer who traveled throughout India in the last half of the 17th century, "all these palaces are full of gardens with running water flowing through channels into reservoirs of stone, jasper, and marble. . . . In the gardens of these palaces there are always flowers according to the season" (Roberts 2001).

To keep them green throughout the hot season (which on the plains could be withering), the gardens required sophisticated engineering and planning. Depending on the location, rivers, wells, or irrigation works transported the water to the gardens. Disgusted with the feeble gardens he found at Agra, Babur had a well dug and immediately began building a new garden along the banks of the Jamuna River. As conservation historian Judith Roberts has noted, the water provided multiple uses; it irrigated the gardens, created cooling fountains, and filled the numerous baths throughout the gardens. For the Mughal nobility, used to the cool summers of Central Asia, the gardens truly were Edenic.

Other gardens, such as those in the capital of Delhi, required moving water from a distance. In 1561, for instance, the emperor, Akbar, revived the great Western Jamuna Canal, which had remained filled with silt and had been of no use since the time of the Tughluqs. Akbar ordered that the canal "be made so wide and deep to Hisar that boats may ply upon it in every part; it is my will that the Superintendent builds bridges and bunds [embankments] where necessary, that every season of cultivation a sufficient supply of water be given to all who aided in excavating the canal and they obtain water all year round" (C. Singh 1991, 99). Akbar envisioned the canal as a tool for communication, transporta-



Shalimar Bagh, a Mughal garden in Kashmir. (Sheriar Irani)

tion, and irrigation; in addition, of course, the water flowing to Delhi was put to use in new gardens.

Gardens played an important role in Islamic South Asia, particularly in terms of conceptualizing nature. Well before the advent of the Mughals, the Deccan landscape was splashed with colorful gardens. As Omar Khalidi notes, far from spreading from the north to the south, garden culture in the Deccan

greatly influenced the north; indeed, Deccan landscaping formed a “bridge between Safavid Iran and Mughal India” (Khalidi 2007). The gardens also equated the beauty of the natural with religious aspirations. As Ronald Inden (2007) has noted, the gardens were often designed with an emphasis on the afterlife. Muslim gardens were not simply for viewing enjoyment; they were meant to represent paradise on earth. To represent the spirit as holistic, other senses, especially hearing and smell, were as essential as sight. Inden notes that many gardens were arranged with a tree in the center and a fountain sending water through channels flowing in the four main directions. Such symbolism represented the tree of life, with four rivers flowing to all peoples. Practices also emphasized the forthcoming joys of paradise. Huge banquets, theater, poetry readings, hunting expeditions, and other massive spectacles emphasized an Edenic lifestyle. They also subtly helped validate the current king by implying that God had favored him by showing him the delights of paradise. This practice of equating nature with heaven probably reached its peak during the time of Akbar; although gardens remained crucial, under the reign of Shah Jahan architecture became the focal point of Mughal glory.

The legacy of the first Mughal emperor, however, extended well beyond the introduction of gardens; Babur laid the foundations for an early empire that stretched across North India. Unfortunately, he ruled for only four years, and his death left a leadership vacuum that was only weakly filled by his son Humayun (1530–1556). Humayun had little of the lust for conquest that his father had had and that his son would have. Although a great patron of the arts (he was an enthusiastic supporter of the emerging school of miniature paintings) and a learned astronomer, his addiction to opium worked against any ambition he may have had to equal Babur’s military ambitions. In 1539, his forces were defeated by Sher Shah Suri, forcing him to seek the protection of the Persian emperor (and, humiliatingly, convert to Shiism). Only with the death of Sher Shah and the subsequent contest for control was Humayun able to return to Delhi in 1555. Within a year he was dead, having fallen down the stairs of his observatory. It would be left to his 13-year-old son to continue the quest for Mughal control of all South Asia.

AKBAR

Akbar was born in Afghanistan while his father was in forced isolation from India. Upon assuming the throne, he faced three challenges. His age meant that he faced ambitious challengers within his inner circle; he had to move immediately to consolidate his authority. Second, he needed to expand and consolidate



Mughal emperor Akbar. (Giraudon/Art Resource)

the empire itself. Finally, he was determined to integrate the South Asian people themselves into the Mughal system.

The first two were accomplished with the introduction of the mansabdari system. Detailed in Case Study A, the mansabdari system addressed the issues of loyalty, expansion, and revenue. Each member of the nobility swore his loyalty to the person of Akbar rather than the empire and in return received a military ranking from the emperor. A noble's salary, which was paid in the form of revenue farms known as jagirs, was based on his ranking, which Akbar could withdraw if he was suspicious of the noble's fidelity. It was thus in the noble's best interest to pledge himself to the emperor.

Akbar's relationship with the ulema was more contentious. The emperor faced a conundrum: To persuade the indigenous population that the Mughals were a legitimate South Asian power rather than a foreign usurper, Akbar needed to synthesize the Afghan-Persian conquerors with the primarily Hindu Indian population. To this end, he hoped to emphasize those aspects of Islam (in particular Sufism) with which the bulk of the population was more familiar and less uncomfortable. The ulema, many of whom had conspired with Akbar's challengers when he first came to the throne, in general distrusted the young emperor's goals when he first emerged as his own man, and they soon found themselves in a battle over orthodoxy.

The emperor never believed himself to be anything but a devout Muslim; rather, he wanted to show a visage of the faith that was tenable to the multiple religions in India. To this end he turned to the patronage of Sheikh Salim Chisti, a living Sufi saint. More than 10 years into his reign, the emperor had no heir, and he turned to Sheikh Salim to intervene with God. In 1569 his son Salim (who would become the emperor Jahangir) was born. When the Sheikh died two years later, Akbar first had built a magnificent mausoleum for the Sufi saint and then, around the tomb, a new capital, named Fatehpur Sikri ("Place of Victory"). A planned city, the palace and the nobles' houses surrounded a man-made lake greater than 27 miles in circumference, which fed the gardens that dotted the city's landscape.

Aside from the palace, the city was dominated by two major structures: the Jama Masjid (Great Mosque) and Diwan-i-Khas (Hall of Private Audiences). Although the former symbolized his commitment to Islam, the latter sealed his reputation as a nonorthodox Muslim. Within the hall Akbar encouraged discussions among representatives of various religions; Sunni and Shiite ulema, Buddhist monks, Jewish rabbis, and European Jesuit priests argued doctrine while Akbar listened from above. This free discussion, combined with Akbar's earlier insistence that he alone was the ultimate interpreter of religious law, and his abolition of the *jizya* (the poll tax on Hindus) enraged the orthodox, some of whom labeled him a heretic. In fact, his was a practical strategy for consolidating his control more tightly. As John Richards has noted, Akbar had more than one reason for building Fatehpur Sikri. Paying homage to Sheikh Salim Chisti may provide one of the answers for the move, but he was clearly establishing his independence as well. His separation from the traditional Muslim imperial center of Delhi, and his unique design of Fatehpur Sikri as his personal court, helped establish him as a strong, independent ruler whom no one dared challenge (Richards 1993, chapter 2).

Akbar's legacy to India is vast. His system of centralized administration is familiar to today's students of contemporary India. His expansion of the empire



Diwan-i-Khas, or Meeting Hall, at Emperor Akbar's capital of Fatehpur Sikri. (Francesco Venturi/Corbis)

was significant, covering territory from Afghanistan to Bengal and south to the borders of the Tamil kingdoms. By the end of the century of his death, Akbar's method of expansion allowed the Mughals to control the subcontinent as far south as the Cauvery River. Yet his monumental impact on changes in the environment is sometimes overlooked. His impact on the land is detailed later in this volume. We have seen his interest in building canals for travel, communication, and water transportation, but the emperor also clearly understood the psychological and symbolic meaning of space and land. By moving his capital to reaches untouched by nonindigenous Muslims, and by using an architecture that combined Muslim design with his own unique additions, Akbar truly was a ruler who expanded the relation between humans and their environment.

SIKHISM

The last of the great Indian religions is Sikhism. Aside from being crucial to the course of Indian history in general, the majority of Sikhs reside and farm in the

fertile wheatlands of the Punjab. This important location will play a prominent role in strategy and decision making on the part of the government when many Sikhs begin questioning their status in independent India.

Both Muslims and Hindus claim that the Sikh religion is an offshoot of their respective religions. In fact, it is neither. Muslims have claimed it because the religion is monotheistic, and Hindus argue that the importance of karma and transmigration in Sikhism make it a reform movement of Hinduism. Although it is true that there are syncretic aspects of the religion, Sikhism must be seen as its own, independent system of beliefs.

The religion was founded by Guru Nanak (1469–1539). Born into a Hindu family near the city of Lahore, Nanak preached a religion based on release through the meditation of the divine name of God. The universal aspects of the religion may be seen in the sacred book of Sikhism, the *Guru Granth Sahib*, which contains not only the sacred teachings of the early leaders of the faith, but those of Hindu and Muslim spiritual leaders as well. Guru Nanak was succeeded by nine gurus; under the first four, Sikhism was strictly a populist religious movement. Many of the eventual changes in the religion coincided with the evolving relations with the Mughal Empire. The early gurus had, in general, little opposition from the Mughals; indeed, some believe Akbar gave the land grant of the Holy City of Amritsar (the spiritual capital of Sikhism) to the third guru as a present. With Akbar's death, however, relations turned sour. His successor, Jahangir, became increasingly worried about growing Sikh power in the strategically and economically crucial region of the Punjab. When the fifth guru, Arjun Dev, gave a blessing to Jahangir's son Khusrau, who had rebelled against his father, the guru was captured and summarily executed. Arjun's son Hargobind reacted by donning two swords, one for the spiritual realm of Sikhism and one for the temporal, thus creating a duality in the faith, which culminated when Guru Tegh Bahadur, the ninth guru, was beheaded by Emperor Aurangzeb in 1675 for refusing to convert to Islam. His son, Guru Gobind Singh, the tenth and last of the gurus, restructured the community by introducing the Khalsa, or Brotherhood. Not all Sikhs joined the Khalsa, but those who did agreed to adopt distinct exterior symbols of their membership, which were uncut hair and the wearing of a sword or dagger. Eventually three more symbols were added: a comb, a distinct undergarment, and a metal bracelet. Together these became known as the 5 Ks, so called because their Punjabi names all begin with the transliterated letter "k." In addition, all men in the Khalsa added the surname "Singh," or "lion," while all the women took the surname Kaur, meaning "lioness." Although these symbols unite the Sikh community, they have at times been identifying factors that have led to great persecution, not only in India but in Western countries as well.

With the death of Guru Gobind Singh, the line of holy gurus ended. Later Sikh leaders increasingly focused their attention on the peasantry, abolishing landlordism and introducing peasant ownership. It is no coincidence that the base of Sikhism is composed of peasants of Jat ethnicity. The religion's followers would continue to haunt the Mughals, playing an important role in the eventual disintegration of the empire (McLeod 1975, 293–302).

THE LATER MUGHAL EMPERORS

Akbar was succeeded by his son Jahangir, whose 22-year rule (1605–1627) was marked by constant warfare. With his attention turned increasingly to regaining absolute control of the Punjab, Jahangir sent his son Khusrau south with the bulk of the Mughal army to recapture the Deccan. His success there immediately led Khusrau to rebel against his father, ending with an uneasy truce until Jahangir's death. Khusrau's reign as the emperor Shah Jahan (1628–1658) marked the height of opulence and luxury in Mughal India. It also marked the beginning of the end for the Mughals.

Shah Jahan's ability to spend seemingly infinite sums on the arts was due in large part to the vast amount of bullion flowing into India. His reign coincided with the ascendancy of the European East India Companies, the trading firms, either private or state-owned, each holding a monopoly to sell goods from Asia in its respective country. For Shah Jahan, the huge amounts of precious metals that the companies exchanged for goods provided the wealth for many of the monuments that still symbolize the power and wealth of Mughal India.

For the first 20 years of his reign (1628–1648) Shah Jahan made Agra his capital, where he began establishing his reputation as a great patron of the arts. His first artistic undertaking was a new throne, for which 10 million rupees were set aside to purchase precious gems such as rubies, emeralds, pearls, and diamonds, which were to adorn the throne. The Peacock Throne, as it was known, was taken as plunder by the Persian king Nadir Shah, and subsequently became the symbol of the Persian monarchy until the overthrow of the Pahlavi regime in 1978.

The crowning, albeit tragic, achievement of his time in Agra was, of course, the Taj Mahal. In 1631, Shah Jahan's greatest love, his wife, Mumtaz Mahal, died while delivering her 14th child in 15 years; she was 39 years old at the time. Her mausoleum, on the banks of the Jamuna River, covers well over 30 acres and took 17 years to build. Craftsmen from across Asia and Europe were commissioned to construct the memorial. Materials came from across Asia, including jade, marble, and precious jewels. The garden was divided by a reflecting pond,



The Taj Mahal. (Corel)

which still provides the mirror image of the mausoleum on a clear day. The Taj Mahal is considered one of the greatest edifices in the world.

With the death of Mumtaz Mahal, Agra seemingly lost its appeal to Shah Jahan; in 1639, ground was broken for a new capital just south of Delhi. The two prominent buildings in Shah Jahanabad were the Jama Masjid, the largest communal mosque in India, and the Red Fort, the center of which was the Diwan-i-Khas. Inside this Hall of Private Audiences was placed the Peacock Throne; the walls were engraved with the Koranic exclamation that “if there be a paradise on earth, it is here, it is here!”

Shah Jahan’s reign represented the apex of the Mughal Empire. Mughal control reached to its farthest point, and the flow of bullion and moneys into the imperial coffins provided the good life for those within the mansabdari system. Below the surface, however, were the symptoms of decline. The number of mansabdars in the system had risen beyond 10,000, meaning that the wealth had to be spread more thinly. As with most agrarian societies, the peasants bore the brunt of whatever shortages this may have caused.

The second, and most immediate, crisis concerned the emperor’s four sons, each of whom was carefully positioning himself to replace his father as ruler. For our purposes, two of these sons are notable: Dara Shukoh and Aurangzeb. Dara Shukoh, Shah Jahan’s favorite, was an intellectual who looked at India and its

various traditions much as his great-grandfather Akbar had. Dara came to regard the Hindu texts as the basis for all religious traditions and began translating the texts from Sanskrit into Persian (Richards 1993, 152). These translations had global ramifications (including their influence on naturalists in the American transcendental movement), for Persian was an international language. The texts were then translated into European languages, including, for the first time, English. However, they did little to endear Dara Shukoh to the ulema and the orthodox in the Mughal administration. Aurangzeb, on the other hand, was a devout and conservative Muslim who had the backing of the Islamic hierarchy. He was also a superior warrior. Shah Jahan's illness provided the excuse for Aurangzeb to attack Dara Shukoh in order to "save Islam" in India. Early the following year, having recovered from his illness, the emperor attempted to throw his support behind his favorite son. In response, Aurangzeb arrested his father and imprisoned him in a dungeon in Agra, where he remained until he died nine years later. With his father now powerless, Aurangzeb easily disposed of his brothers and was crowned emperor in 1658. His was the longest and most contentious reign of all the great Mughal leaders. With his death the days of Mughal supremacy ended.

Aurangzeb's reign has often been characterized as intolerant; indeed, early British historians, looking to justify their empire, held Aurangzeb up as exemplifying "oriental despotism." This image is only partially accurate, however, and certainly not the major cause for the end of the Mughal Empire. The emperor certainly did infuriate a large proportion of the population by reintroducing the *jizya*, and he also alienated a large number of Hindus by not allowing new temples to be built. He did not, however, introduce forced conversion, and Hindu Marathas, who would prove to be his greatest enemies, held mansabdars within the administration. More important to the weakening of the empire, however, were war and, perhaps ironically, the chase for Indian goods, which had by then become a global competition.

Aurangzeb became involved in military action across much of India, but the constants in his wars were the Sikhs and the Marathas. The Sikhs had evolved into a military band that was a continuous thorn in the side to the emperor. His greatest challenge, however, came from the south, in the form of the Marathas and their leader Shivaji Bhonsla (1627–1680).

The Marathas were Hindu peasants in the western Deccan, many of whom had learned Mughal military skills while serving with Shivaji's father, who had been a mansabdar under Shah Jahan. We have seen problems in controlling the Deccan throughout Muslim rule in India, but the Marathas represent more than an example of the Mughals stretched too thin; rather, the Deccan Wars were a sign of the weakening of confidence in and loyalty to the emperor, and by

extension the mansabdari system. Also, Shivaji was unlike any military leaders the Mughals had seen before, one whose stated goal was to reestablish a Hindu kingdom in the Deccan. From 1658 until his death in 1680, Shivaji consumed Aurangzeb's attention to the point of obsession. In 1664, the Marathas attacked Surat, a major port and British trading post on the western coast, holding hostage pilgrims to Mecca until the government ransomed them. The emperor tried integrating Shivaji into the mansabdari system, but the plan backfired, and in 1674 he declared independence on behalf of the Marathas and had himself crowned Chhatrapati, a title specifically given to a Hindu king. Shivaji used Hindu symbolism as an effective unifying factor, and many of his followers saw him as the incarnation of the great god Shiva. Upon his death in 1680, he became an iconic symbol whose significance to the Indian independence movement will be seen later.

While Shivaji infuriated Aurangzeb, it was his successors who played a significant role in the decline of the Mughal Empire. Two years after Shivaji's death, Aurangzeb established a new capital in the Deccan expressly to respond to the Maratha warriors. Named after himself, Aurangabad was approximately 130 miles north of the Maratha capital of Pune. The new capital was fewer than 10 miles away from the Tughluq capital of the 14th century, and the Mughals would suffer the same consequences as the Tughluqs for building a southern capital. The Mughals did not know how to defeat a guerrilla army, especially one that was familiar with Mughal tactics. The emperor's forces would capture hundreds of forts, but they were of little strategic value. The Marathas in surrounding villages would hide the warriors and provide them with goods and services. Aurangzeb responded with harsh policies, burning villages and crops, but to little avail. In the process he alienated his own military, who hated the heat of the south and became increasingly disenchanted by the emperor's obsession. An additional factor was the disillusionment of the mansabdars, for while more military personnel needed to be incorporated into the system to conquer the Deccan, the subcontinent offered little in the way of unclaimed arable lands, and so new jagirs were scarce. A disheartened Aurangzeb died at Aurangabad in 1707, and with him ended the era of great Mughal glory and prestige.

THE DECLINE OF THE MUGHAL EMPIRE

The Mughal Empire technically lasted until 1858, but it was unrecognizable as an empire for well over a century before that date. In the Deccan, the Marathas allied themselves with a mixed group of landlords, regional notables, and village

leaders. As Burton Stein has noted, this new elite, once integrated, would become a new class, eager to do business with whoever emerged as a powerful economic partner. For about half a century this was the Maratha Confederacy itself, which at its height reached as far northwest as Punjab and northeast to Bengal (Stein 1998, 181–196). As the Maratha Empire began to fall apart, however, this group began working relations with the European companies.

Meanwhile, Delhi became a vacuum, seemingly sucking in the worst of the nobility, while excluding those with ability who may have been interested in saving the empire. These nobles instead opted for regional states, giving nominal loyalty to the position of the emperor, but keeping the revenue for themselves. One such example was the Nizam ul-Mulk, who became vizier, or chief minister for the emperor Muhammad Shah in 1722. Increasingly, he urged the emperor to reform the structure of administration, by lowering the number of mansabs and expelling the sycophants from his court. When Muhammad Shah refused, the nizam (prince) “retired” to the Deccan, where he formed the Princely State of Hyderabad, which remained intact until after Indian independence. Similar autonomous states were formed in Bengal, Awadh, and the Punjab. The symbolic coup de grâce to the Mughal Empire came in 1739, when the Persian emperor Nadir Shah sacked Delhi, killing thousands and taking the Peacock Throne as plunder.

What caused the downfall of the Mughal Empire? The reasons are many and complex. Gone are the days when the empire’s demise could be dismissed as an example of “oriental despotism,” Hindu-Muslim enmity, or the arrival of the Europeans. The reasons must instead be found in the social, military, and cultural milieu of India in the first half of the 18th century. Although the arrival of the Europeans was certainly of consequence, it does not explain the disintegration of an empire that had been held in global esteem for almost two centuries. Indeed, part of the answer can be found in the fact that Mughal rule had worked too well. The breakdown of the mansabdari system in the mid-18th century would suggest that its participants were not willing to voluntarily settle for less wealth and prestige than their families had experienced at the height of empire. When the system could not or would not change to meet the expectations of its essential members, the mansabdars turned their loyalty to those regional leaders, such as Nizam ul-Mulk, who could give them the revenue assignments they believed were their due. The more skillful or ambitious the noble, the quicker he seemed to turn away from Delhi.

The Deccan War certainly hastened the breakdown. The move of the capital to Aurangabad left North India vulnerable, making it much simpler for nizams and nawabs (provincial governors) in such places as Bengal to become *de facto* independent states. As the system began to break down, these regional rulers

made new alliances with an emerging landed gentry that was no longer tied to the mansabdari system. These zamindars, along with bankers, moneylenders, and other regional leaders, formed a new class in the north that worked with the nawabs in the same manner as their peers in the south worked with Marathas. The decision of many members of this new gentry to bankroll the British East India Company's expeditions in North India was fundamental in the eventual European conquest of India.

Finally, India's environment played a crucial role in the disintegration of Mughal rule. The bounties of the harvest had been the very foundation of the revenue system. India's spices, cloth, and other cash crops acted like a magnet, drawing bullion from the New World through Europe and on to South Asia. This huge wealth accounted for the profligacy from the time of Shah Jahan and the inflation that accompanied it. The more the emperors spent, the more people they brought into the mansabdari system; there simply was not enough arable land to produce revenue assignments that would satisfy everyone. When land ran out, the nobles shrugged and "opted out" of the system.

THE BRITISH EAST INDIA COMPANY

The emergence of the British East India Company in the early 17th century was in part fueled by fundamental changes in class and class relations in England in the century before the Company's founding. Enclosure acts hastened the shift of the peasantry from serfdom to tenancy, and the accompanying privatization of cultivable land was critical in the rise of a wealthy, landed gentry during Elizabethan times. In 1600, members of this emerging class, along with London bankers and merchants, became the founding members of the Company, receiving a monopoly from Queen Elizabeth to sell their goods in Britain. Their fortune in finding an equally ambitious protocommmercial class in India was the key to their success.

The draw of India was of course its natural abundance. In many ways the British East India Company was fortunate in that it had trailblazers to follow. The Portuguese had discovered the value of spices at the end of the 15th century, and the Dutch had firm control of the Spice Islands by 1620. The British looked to India for their share of the rich market. In 1619, Sir Thomas Roe, the envoy from King James I, received permission from Jahangir to establish a factory at Surat. From there the British East India Company followed the pattern of the Dutch. The fleet would sail to Surat with its bullion to trade for Indian goods. It would leave merchants, or factors as they were known, to negotiate for goods. The fleet would return to England with the Asian goods and return with more

bullion. Because the return journey took approximately a year, the factors had plenty of time to barter for the best wares, storing them at the factory. By the end of the century the Company had established more than a dozen factories, the most important located at Bombay, Madras, and Calcutta. The more successful the trade, the larger the factories became, with fortresses and private armies, staffed by soldiers known as sepoy, to protect them. Fort St. George at Madras and Fort William at Calcutta were particularly well fortified, for they both faced competition from the French, who possessed nearby factories at Pondicherry and Chandernagur.

Seemingly the trading system offered wealth for everyone. Certainly the British East India Company was making fabulous amounts of money for its stockholders. Thousands of Indian middlemen were hired by the factors, and were given contracts to purchase spices and cloth. Richards notes that by the mid-17th century Indian textiles were cheaper than English wool and linen, so much so that between 1664 and 1684 the import of cotton cloth rose from 5 million square yards to more than 32 million square yards. Other goods that were greatly valued were saltpeter for gunpowder, raw silk, and indigo (Richards 1993, 197–198). Increasingly, hardwoods such as teak and sal became inordinately valuable for shipbuilding, especially after the rapid deforestation of England itself; as we shall see later, this clear-cutting of hardwoods had dramatic repercussions on the Indian landscape. By the 18th century, opium had become a mainstay of trade, and later Indian tea, produced at plantations in the Himalayas and Nilgiris, kept the Company afloat.

There was, however, a major inconvenience in the trading reciprocity. Indian goods were sold in Europe in great abundance, but Europe had virtually no goods that were desired in South Asia. The universal exception to this was precious metals. Bullion, as we have seen, provided much of the wealth for the later Mughals. Increasingly, however, the drain of precious metals from Europe to Asia was causing consternation with European governments, thanks to the dominant economic paradigm of the time, mercantilism.

Mercantilism was an economic system that measured a country's wealth (and economic prestige) by the amount of precious metals the nation had in its reserves. To preserve its wealth, a country needed to export more goods than it imported. Yet clearly this was not possible with South Asia; Europe was ravenous for Asian goods, but Asia was disinterested in most goods Europe had to offer. In short, the East India Companies faced a conundrum: The more successful the companies became, the greater the drain of wealth in Europe, and the subsequent loss of economic prestige and power. The roots of the British Empire can be found buried in this contradiction, for the solution that presented itself was one of using Indian goods to purchase other Indian goods. To do that, however, the Company



Cardamom and turmeric were two of the many spices that lured European merchants to India. (Anne Clark)

needed economic control over a given area that produced the goods they wished to trade. This meant conquest in some form.

By the middle of the 18th century, the French and the British were the two main powers jockeying for power in India. In 1746, using the cloak of the War of Austrian Succession being fought in Europe, the French East India Company, led by a remarkable leader by the name of Joseph Francois Dupleix, captured Madras from the British. When Dupleix's troops were in turn attacked by the regional nawab, the company troops easily defeated an army 10 times its size. At this instance Dupleix discovered the rules of empire building: smaller, well-disciplined armies of sepoys armed with technologically advanced weapons could defeat forces much larger than themselves. By placing his forces at the disposal of one of the contestants in a fraternal fight for the crown (without primogeniture, these fratricidal wars were a constant), Dupleix was in a position of advantage when his troops defeated those of the enemy. Finally, he realized that it was essential to leave the indigenous prince on the throne, while the French East India Company would surreptitiously take control of the revenue. In this way it was difficult for the Mughals to reunite under the banner "*Dar al-Harb*" (literally, "House of War") in an attempt to protect India from European conquest.

Within a decade, however, the French had been superseded by the British. Part of this was because the French East India Company had lost faith in Dupleix after an unsuccessful contest for the throne. Another cause can be placed on the shoulders of Robert Clive (1725–1774), whose ambition and avarice helped provide the incentives for the Company to establish the "British Bridgehead" in Bengal (Marshall 1987). Clive had been imprisoned in Madras when the French had captured the city and had become a great hero when his troops withstood a siege of the fortress at Arcot some five years later. He was about to gain much greater fame and fortune.

Bengal had become an autonomous state in 1740 under Nawab Ali Vardi Khan, who immediately conflicted with the Company merchants working out of Calcutta and Patna, the capital of Bihar. Patna was an especially important commercial center for the British; it sat on the Ganges River, providing easy access to the Bay of Bengal. It was also the location of the largest opium factory under British control. British merchants and Indian subcontractors crisscrossed the state, purchasing or consigning shipments of silk, indigo, cotton goods, and, of course, opium. Contentions arose, however, over what should be the cut for the nawab. The Mughal government had granted the Company the right to free trade in Bengal. What, however, constituted free trade? The Company, echoing the new European mantra, claimed that the decree allowed them absolute free trade, without having to pay tariffs and taxes to the Bengal administration. To

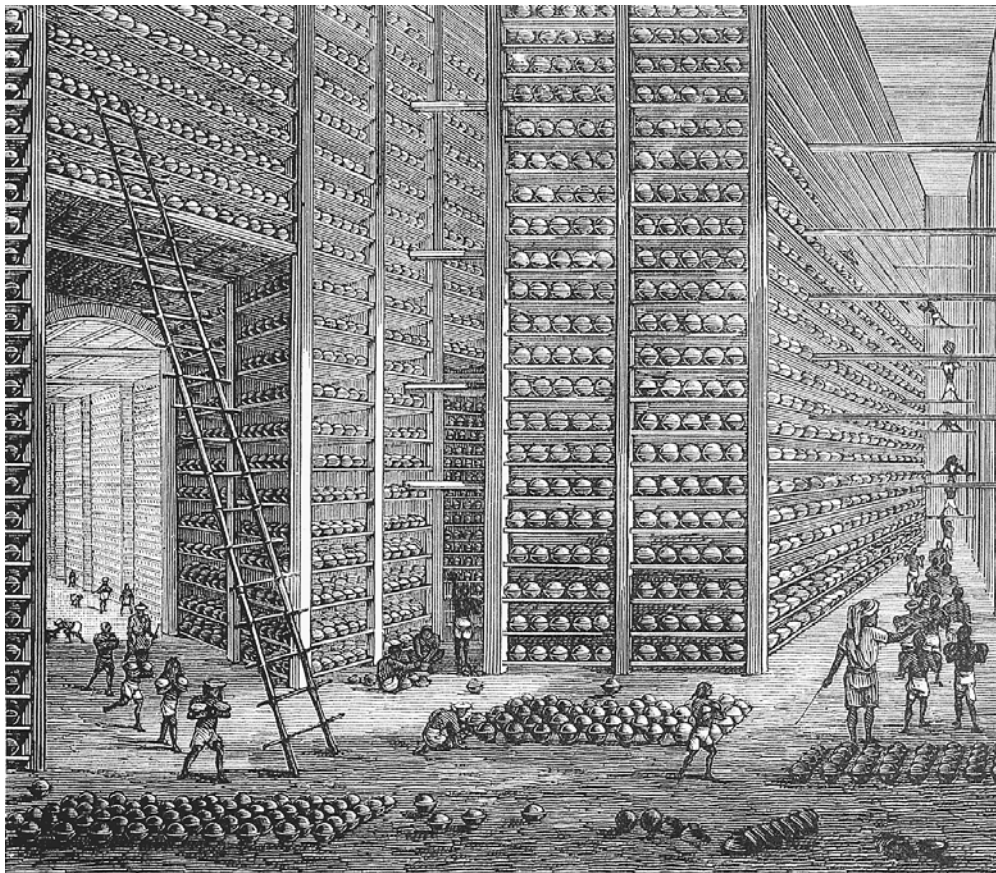


Illustration of a British opium factory in Patna, India, 1882. (Roger-Viollet/The Image Works)

Ali Vardi Khan, this argument was simply an attempt to legitimize plunder. Furthermore, since the Company was continually demanding more cash crops, land for food crops would by definition shrink. Since Bengal was still using land revenue as its source of income, the nawab had a legitimate concern about shrinking revenue.

In 1756, the nawab's death resulted in the ascendancy of his grandson, Siraj-ud-daula, to the position of authority. Siraj, unaware of how fragile his position was, turned his attention to Fort William, which had added extra fortifications without the new nawab's permission. To Siraj this was simply a continuation of the disrespect paid to his grandfather, and in the summer of 1756 he marched on Calcutta. Facing virtually no resistance (the Company governor having fled with most of his troops), Siraj entered Calcutta on June 20, tore down the newly built fortifications, and prepared to return to his capital of Murshidabad, north of Calcutta. That night, however, some of his troops locked up the European

survivors in a small dungeon. Between the heat and lack of air, many of them died. Although the precise number of dead may never be known, the "Black Hole of Calcutta," as the event became known, provided legitimacy for empire building in India for at least a century. Its importance to environmental history will become clear when we focus on colonial public works in the following two chapters. The image of the South Asian as savage and particularly uncivilized, encapsulated in the Black Hole, would persuade many an engineer that indigenous knowledge was of little use when building dams, railways, canals, and the like. This sense of innate scientific superiority had varied consequences for the land and the people, many of them negative.

The Black Hole also provided the incentive for establishing an imperial toehold in Bengal. As word reached Madras of the Calcutta affair, Clive was dispatched to take back the city and the fort. When he reached Calcutta he easily recaptured Fort William, and there the adventure should have ended. Clive, however, was eager to pursue his own fortune, and the Company preferred a nawab who would agree with their definition of free trade. Through an alliance with the great bankers of Calcutta, led by the enormously wealthy Jagat Seth, Clive made a secret pact with Siraj's grand-uncle, Mir Jafar, to betray his leader on the battlefield. The bankers' fortunes were used to bribe the troops not to fight. At the Battle of Plassey, on June 23, 1757, Clive defeated Siraj-ud-daula, thus inspiring the battle and the date as the symbolic beginning of the British Raj. In fact, the battle did little to establish the British as rulers. It did make Clive one of the richest Europeans in the world, however, and it set the Company on a path that would eventually force it to administer the province as well as collect its revenue.

In Bengal, the Company set up the "dual system," whereby Mir Jafar and his government would be charged with ruling while the Company went about its business trading and collecting revenue. In theory, the Company was now in the position it had sought for years. Now out from under the weight of mercantilism, it could use Bengali goods, purchased with local revenue, to purchase other goods from all corners of South Asia. Their expenses, however, had increased enormously. The Company in India was now expected to finance not only local trade but also trade with China, for Chinese tea was becoming increasingly valued in Britain. Little revenue was left for the nawab to fund the government. When Mir Jafar balked at turning over more revenue assignments to the Company, he was accused of disloyalty and replaced by his son-in-law Mir Kasim, who was thought to be more pliable.

The replacement of Mir Jafar was resented by many in Bengal; so too was the seemingly arbitrary way in which individual merchants defined "free trade." Trade in saltpeter and textiles multiplied, and merchants began trading in salt,

which had been the private preserve of the nawab (Marshall 1987, 83–87). The crisis came to a head in 1764, when Mir Kasim fled Bengal to Awadh, where he appealed to the remnants of the Mughal Empire to put aside their differences and form a unified army to defeat the British before the East India Company became strong enough to defeat them. Although they did unite for one last effort, it was already too late. Using Dupleix's tactics, the British East India Company forces defeated the last vestiges of the Mughal Empire at the Battle of Buxar in eastern Bihar. In return for a large stipend, the Mughal emperor granted the Company the right to collect all revenue in Bengal in perpetuity. Now a legitimate heir to the Mughal Empire, the British East India Company could claim a rightful place in the pantheon of autonomous states within the nominal boundaries of the Mughal Empire.

CONCLUSION

Although the Mughal Empire is most famous for its expansion and its architecture, the regime also had a profound effect on the environment. From the early gardens of Babur to the extensive changes to the landscape of Bengal (described in Case Study A), the empire manipulated the nature of India in ways that changed society, culture, and the environment. Warfare led to deforestation, overgrazing, and overcropping. The Mughal love of hunting affected the animal population across North India. Irrigation systems were excavated and reactivated. The Mughals' Edenic view of nature influenced culture across the subcontinent. Finally, they set in motion an economic and revenue system that would affect both the people and the environment of South Asia in extraordinary ways for the next two centuries. The next two chapters show how the British colonial government would leave in its wake an India that would have been unrecognizable to the pre-Mughal societies.

COMPANY RULE

The period beginning with the governor-generalship of Lord Charles Cornwallis (1786–1793) and ending with the 1857 Rebellion marks an era that was in many ways defined by British perceptions of the relationship between the Indian population and its environment. From land tenures, through an environmental interpretation of the Indian physical constitution, and on to a philosophy that saw conquest of nature as a legitimizing factor for empire, British policy, based on a Eurocentric view of nature and its purpose, affected South Asia's ecology and its people in ways that are still evident today. To understand the drastic changes in the environmental history brought about by the Company and its successor the crown, the roots of the "Ideologies of the Raj" must first be detailed (Metcalf 1994).

It would be simplistic to suggest that the colonizers had one ideology that both legitimized and explained the reasons for conquest. Volumes have been written about this topic since historians first started studying the British Raj, and new interpretations appear every year. Making sense of the empire within the confines of the next few chapters will require that we try to incorporate the various ideologies put into effect in India into but a few categories, namely economic, political, and cultural. All three areas deeply affected the environmental history of South Asia. Before diving into specifics, however, a few overarching interpretations of colonial policy need to be perused.

To get a sense of the evolving nature of colonial policy in India, we must first understand that South Asia was, in many ways, a laboratory for testing political ideologies emerging in Europe during the 18th and 19th centuries. This period was a time of drastic and traumatic change in Europe. Beginning with the Enlightenment in the late 17th century, and sweeping through the 18th century with the Industrial, American, and French Revolutions, Europe was enveloped with the fervor of drastic economic and social change. Many of what today are considered "classic" political ideologies—conservatism and liberalism, in particular—arose in response to the great changes in politics and economy in the West. As the British (and to a lesser extent, other European powers) gained imperial control over vast areas of Asia and Africa, they acquired societies that they

considered inferior in multiple ways, and, significantly, whose members could not vote them out of office if they were upset over policy. It is no coincidence that the concept of “civilizing the natives,” which found its most extreme voice in Rudyard Kipling’s “The White Man’s Burden,” was one of the earliest and longest lasting tools of legitimization for empire. In short, India became a blank slate upon which to formulate responses to revolution and its discontent.

UTILITARIANISM

The most widely advanced economic and political policy in 19th-century South Asia was utilitarianism. Utilitarianism is commonly defined as that which provides the greatest good for the greatest number of people, but the term is so vague that its admirers covered a great many political and social spectrums. The Indian philosopher Raghavan Iyer’s perceptive study of colonial utilitarianism locates four different strands of the practice in colonial South Asia:

Burkean

Named after the conservative politician and philosopher Edmund Burke, this strand saw India as an imperial trusteeship. Britain’s duty could be summed up as Pax Britannica; just as the Roman Empire had brought the rule of law to its colonies, so too should Britain provide law and order to South Asia.

Benthamite

Jeremy Bentham, who developed modern utilitarianism, was an advocate of state intervention to achieve the goals of social advocates for spreading the greatest good. Benthamites were responsible for the large number of state-sponsored social and educational changes in India, especially during the first half of the 19th century.

Platonic

A doctrine of guardianship, the Platonic strand saw Indians as “eternal Peter Pans” (Iyer 1970, 166). This view often had a racial connotation, as represented in much of the literature of the time. The “guardians” also took pride in their

military power and believed the use of force was often necessary to control the “childlike” South Asians.

Evangelical

Although this strand did promote conversion to Christianity, the Evangelicals also saw British rule in India as their God-given moral duty. They consequently supported English education and the development of European institutions in India (Iyer 1970, 163–168).

Utilitarianism had a profound impact on the evolution of administration and policy in colonial India. In particular, social legislation was introduced to “civilize” India, and it often came into direct conflict with traditional culture and religion across the subcontinent. Although this legislation may not have had an immediate and noticeable effect on South Asia’s environment, its long-term consequences directly influenced the environmental history of the region.

The Evangelicals arguably had the earliest influence on Indian society. In 1792, Charles Grant, who in 1805 would become chairman of the East India Company, wrote a pamphlet on the state of society in India, which he circulated throughout the Company and Parliament. Among his other suggestions, he argued that “In considering the affairs of the world as under the control of the Supreme Disposer, and those territories . . . providentially put into our hands . . . is it not necessary to conclude that [the colonies] were given to us, not merely that we might draw an annual profit from them, but that we might diffuse among their inhabitants, long sunk in darkness, vice, and misery, the light and benign influence of the truth?” (Edwardes 1961, 291). Grant was echoed in 1813 by William Wilberforce, the Evangelical leader of the antislavery movement in the House of Commons: “Christianity . . . has been acknowledged . . . favourable to the temporal interests and happiness of man: and never was there a country where there is a greater need than in India the diffusion of its genial interests” (Edwardes 1961, 291).

Grant and Wilberforce’s lobbying of the Company and Parliament led to the passage of the Charter Act of 1813, which opened India to missionary activity for the first time. Missionary work increasingly focused on medicine and education, both of which were important to the evolving relationship between Indian society and nature. Of equal importance, the 1813 Charter Act abolished many of the monopolies held by the East India Company, which started the process that changed the Company from a business to a governing body. In the early years of Company rule, education emerged as an important issue for the utilitarians. Money had been set aside for Indian education in 1813, but only with the

arrival of Thomas Babington Macaulay in 1835 did education become a serious issue for the government. Macaulay, a confirmed utilitarian, arrived in India as law minister in 1834. In his famous "Minute on Education," delivered to the Government of India shortly after his arrival, Macaulay argued that "it is, I believe no exaggeration to say, that all the historical information which has been collected from all the books written in the Sanskrit language is less valuable than what may be found in the most paltry abridgements used at preparatory schools in England. In every branch of physical or moral philosophy the relative position is nearly the same" (Harlow and Carter 1999, 58).

With the blessings of a series of utilitarian governors general, English education replaced Arabic, Sanskrit, and Persian in the higher grades. In 1835, English replaced Persian as the language of the government and the judicial system, in effect ostracizing an entire class of mostly Muslim translators and civil servants. The anglicization of India culminated with the Woods Despatch in 1854, which called for the formation of the English language Presidency Colleges in Calcutta, Bombay, and Madras (followed by the establishment of similar institutions in many of the larger cities in South Asia) and vernacular education in the *mofussil* (rural) schools across the subcontinent. The changes in the education system had major consequences for the education of scientists and technocrats.

Finally, the utilitarian social legislation of the period also changed the course of the environmental history of the region. Social legislation had more than one purpose. Although legislation ostensibly was introduced to end cruel practices, these laws also played a fundamental role in justifying empire. The most famous of these were the acts against *sati* and *thuggi*. *Sati* was the practice of widow immolation in some Hindi communities. Upon the death of her husband, a widow would throw herself on her husband's funeral pyre, for the purpose, it is believed, of joining her husband in their next reincarnation. Although certainly a heinous practice, questions still remain as to how widespread *sati* actually was. Regardless of the numbers, *sati* became a great legitimizing factor for empire. In 1829, Lord William Bentinck, the strongest believer in utilitarianism of all the governors general, ordered that *sati* be outlawed.

Thuggi was similarly used to represent the exoticism and cruelty of "the Orient." *Thugs* were members of a cult that in theory worshipped the Hindu goddess Kali. In British lore *thugs* traveled across India, strangling strangers with yellow scarves, and offering the corpses as gifts to Kali. In practice, *thugs* were more often mercenaries than cult members. There were Muslim *thugs* as well as Hindu ones, and generally the goal was simply robbery and murder (to leave no witnesses), with little regard paid to Kali. Nonetheless, *thuggi* took its place alongside *sati* as a symbol of India's inability to provide peace and justice to its

own people. In 1835, William Sleeman was appointed superintendent for the suppression of Thuggi and Dacoity (robbery). It is largely from Sleeman's own accounts that the legend of thuggi sweeping across India derived. Evidence shows, however, that Sleeman's numbers were greatly exaggerated. In the Bihar district of Purnia, for instance, one of Sleeman's assistants claimed that he had found "thousands and thousands" of thugs and dacoits across the entire district. He based his findings on the assumption that if the people he saw had no obvious means of subsistence at the time he saw them, they must be criminals (Hill 1997, 62). Nonetheless, thuggi became a popular representation of South Asia in literature and art. The success of the use of thuggi as a publicity magnet can be seen in its appearance in contemporary popular culture, such as the Beatles' film *Help!* or the film *Indiana Jones and the Temple of Doom*.

As the 19th century neared its midpoint, legislation had increasingly come to focus on India's religions and their traditions. As early as 1806 the Company army had attempted to bring about uniformity by ordering the sepoys to wear leather cockades (for the Hindu sepoys, having leather in their hats was extremely polluting); in the South Indian town of Vellore the sepoys mutinied. After the uprising was put down, the governor of Madras was recalled for his lack of sensitivity to religious customs. Interestingly, that governor was William Bentinck, who apparently did not heed the lessons inherent in his recall.

Direct intervention in religious customs soon followed. In 1850, the Caste Disabilities Removal Act gave Hindu converts to Christianity the right to inherit property; this act specifically contravened both Hindu and Muslim law. Six years later the Hindu Widow Remarriage Act was enacted, again with a directive that specifically affected Hindu tradition. The introduction of common dining in prisons was a particularly good example of the utilitarian process, for it mixed castes and religions in a punitive experiment that went horribly wrong. A key debate in England during this period was the purpose of the penal system. Were prisons intended primarily to protect the public from dangerous criminals or were they intended to rehabilitate criminals into honest members of society? While the argument raged in Britain, India became a utilitarian laboratory for prison reform. Under the auspices of Macaulay's Law Commission, "a good system of prison discipline" was introduced, which included common messing (Yang 1987, 29). Before common dining was introduced, prisoners were allowed to purchase and cook their own food, so that the higher castes could avoid pollution. By 1845 common messing was introduced into prisons throughout Bihar. The act required prisoners, regardless of religion and caste, to eat food prepared by the prison cooks, whose castes were presumably unknown to the prisoners. Crucially, the regulation also called for all prisoners to eat together, regardless of religion or caste. The enforcement of the regulation led to protest and rioting,

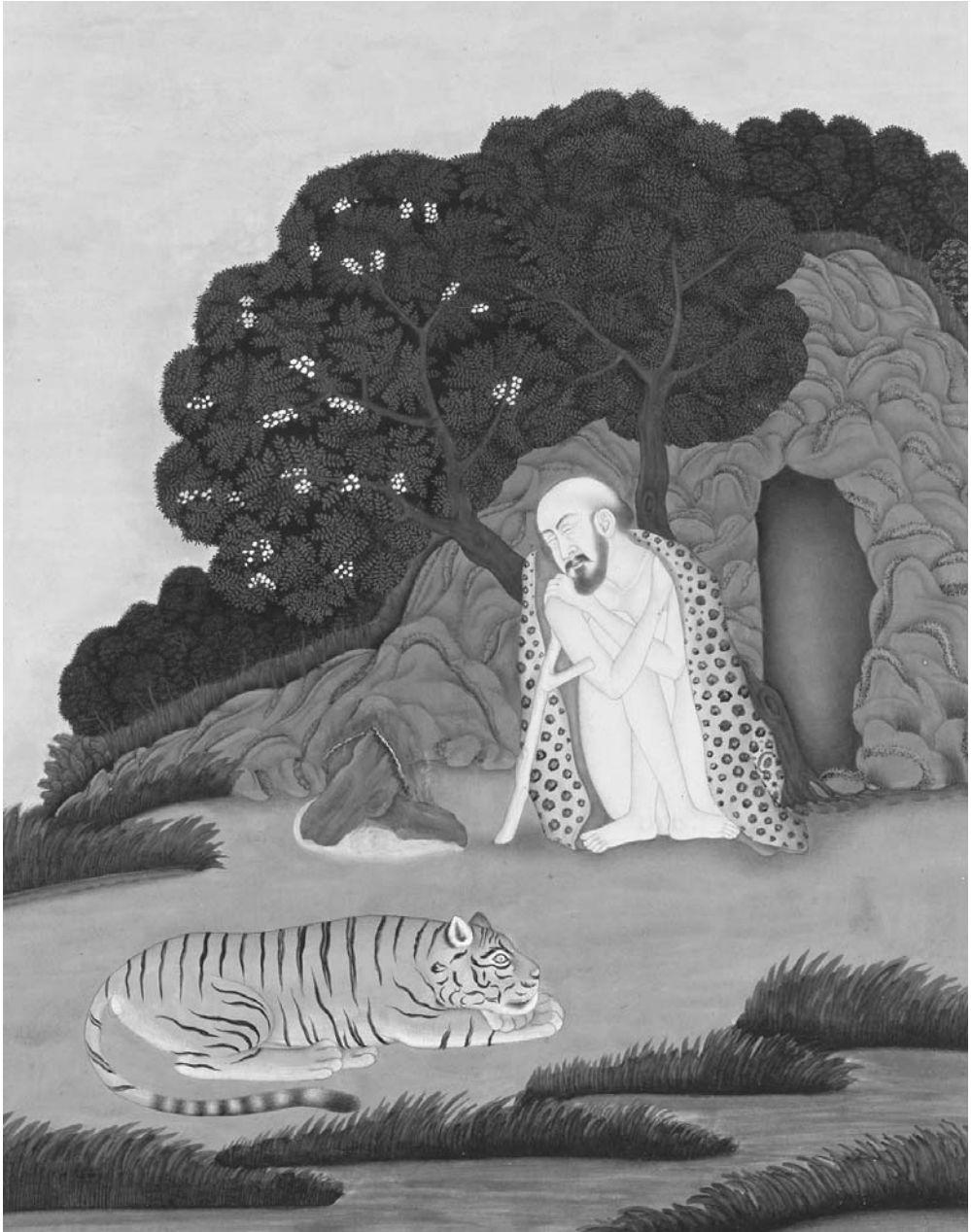
including the 1855 riots that broke out in several prisons when the inspector of jails ordered the confiscation of personal *lotas* (drinking vessels) from the prisoners (Yang 2004, 102–117). This incident gives a sense of the colonial attitude toward local custom and religious tradition. Only a sense of moral superiority and a disdain for indigenous knowledge and values could produce such a policy as this one. When this Eurocentric utilitarianism was inflicted on India's environment, it led to massive deforestation, failed Western-oriented irrigation projects, and a complete misunderstanding of South Asian approaches to disease control and prevention, among other consequences.

Finally, we return to the introduction and enforcement of new military regulations. In particular, the General Service Enlistment Act of 1856 led to a heightened sense of suspicion and anger. Under the act, sepoys no longer had the option of refusing a posting overseas. For many sepoys, crossing large bodies of water led to loss of caste. These are but a few examples of the impact of colonial social legislation. Utilitarianism, as introduced in India, led to hostility and suspicion. Increasingly, the philosophy came to mean "the greatest good for the greatest number of Britons." The arrogance of the colonizers, combined with contempt for South Asian tradition and local knowledge, introduced the encircling concept of Eurocentrism. Eurocentrism, with its absolute belief that European ideas, education, and technology could be inserted into any place and under any circumstance, framed the colonial attitude toward nature and its conquest in ways that would prove to be completely at odds with the unique ecosystems of South Asia.

DIFFERENCE

Another concept that is important to our understanding of colonial environmental history is that of "difference." Thomas Metcalf has argued that "the idea that most powerfully informed British conceptions of India and its people were those of India's 'difference'" (Metcalf 1994, x). By difference, Metcalf means that India was perceived not by its similarities to Europe but by its "strangeness," and thus South Asian inferiority was perceived in everything from race to environment. Terms such as "exotic," "mystical," and "unknowable" all pointed to a country that had no sense of the rational, nor of the emerging "modern."

Difference also applied to the physical aspects of South Asia and not simply to its people. As such, according to imperial justification, climate accounted for the enervation of the South Asian people, as opposed to the energetic British, who were robust because of the crisp air of North Europe. Dirt and disease were also blamed on climatic differences. These differences, of course, included the



Naked ascetic outside a cave with sleeping tiger. Perhaps painted for William Fullerton, Scottish surgeon of the East India Company. Murshidabad, Bengal, India, about 1760. (Victoria and Albert Museum, London/Art Resource)

utility of land, water, and forests, all of which were seen as being “wasted” in the colonial view. According to Metcalf, James Fitzjames Stephens, law minister after the 1857 Rebellion, defined the relationship as one in which the imperialists represented a “‘belligerent civilization,’ whose . . . power in India was ‘like a vast bridge’ over which an enormous multitude . . . were passing from a ‘dreary’ land of ‘cruel wars, ghastly superstitions, wasting plague and famine . . .’” (Metcalf 1994, 57). Ahead of them lay the benefits of European modernity.

One of the major contradictions with this image lay in the fact that even the most strident imperialist had to admit that South Asia had enjoyed various complex and sophisticated civilizations in the days when, as the newspaper *The New York World* noted in 1914, “early Britons stained their naked bodies blue!” (Wolpert 2004, 289). How then to justify the conquest, let alone emphasize the “difference” in civilizations, in such a way as to emphasize European superiority? The answer lay in the interpretation of the history of India.

One response to ancient Indian history was essentially to ignore it. James Mill, a utilitarian director of the Company and father of John Stuart Mill, wrote a six-volume history of India that dismissed South Asian history before the advent of the British. All precolonial history could simply be defined as “oriental despotism,” an era of autocratic darkness before the Europeans brought the light of advanced civilization, governance (and technology) to the benighted people of the subcontinent. Mills states this succinctly in the first sentence of his first chapter dealing with precolonial India: “Rude nations seem to derive a peculiar gratification from pretensions to a remote antiquity” (Mill 1820, Vol. I, 85). For a century Mill’s *History of British India* was required reading for professionals planning a career in India, so its influence cannot be underestimated. Interestingly, for one who claimed the irrelevancy of precolonial history, virtually the entire content of the first two books was concerned with the events preceding the colonial era. Mill’s inability to ignore India’s ancient civilization underlines the colonial problem with defining difference through historical sources.

Unable to ignore India’s tradition, many instead claimed that, while India had once had a great civilization, it had been strangled by oriental despotism. India’s sophistication in engineering, seen in the ancient irrigation systems and its technologically advanced handicrafts industry, not to mention its architecture, city structures, and ancient buildings, made it impossible for 18th- and early 19th-century European residents to deny the superiority of the ancient civilization. Indeed, such early administrators as Warren Hastings and Sir William Jones (supreme court judge in Calcutta in the 1780s and founder of the Asiatic Society) were Orientalists, known for their interest in and admiration for ancient Indian

culture. As Michael Adas has noted, early travelers to India and East Asia “appeared to confirm the view of medieval geographers that the inhabited part of the earth consisted of three continents, and of these, Asia was by far the largest, richest, and most powerful” (Adas 1989, 47).

How, then, to admit to the former glories of South Asia while at the same time justifying imperialism? Here again we return to Mill and his *History of British India*. James Mill argued that the rise of modern Hinduism brought with it a set of superstitions and such a tight class stratification in the form of the caste system that individual innovation no longer existed in India. Echoing Charles Grant, he saw Hindus in particular as fatalistic, indolent, and weak. As Adas perceptively notes, Mill was able to twist any Indian accomplishment into a detriment. Thus, even India’s invention of chess was proof that its people were lazy. Mill concluded, according to Adas, that “Brahmins sat on rocks chanting meaningless mantras, and Indian princes played chess and hunted tigers while cities fell into ruins, bandits marauded in the countryside, and the peasants starved.” Given such a bleak picture, how could England not see that its great moral duty was to conquer and uplift such a people?

SCIENTIFIC VALIDATION

Utilitarianism and the concept of difference were not the only tools for justifying empire and development in South Asia. Increasingly, perceptions of Western superiority in science and technology were used to legitimize the subjugation of India and its people. Indeed, as Michael Adas has demonstrated, by the 19th century science and technology had overtaken both religion and racism as the “evidence” of the superiority of European culture over those of Asia and Africa (Adas 1989, chapter 3). Perhaps more than any other factor, scientific validation explains the colonial view that nature was simply a utility for profit and modernization.

Adas explores the early tools of legitimacy, noting that Christianity meant that the conquerors understood absolute truths of the physical and spiritual worlds that the “heathens” did not. Although some grudgingly admitted that the Muslims in the northwest had some sophisticated qualities—they believed in the Old Testament, ate meat, and wore pants and shirts—the Bengalis most certainly did not. The population of Bengal, with whom the British had the longest and most intimate acquaintance, ate fish, wore lungis (similar to sarongs), and were primarily Hindus. They were also among the earliest South Asians to receive British educations, and as such received a contempt reserved for those

whom the Europeans especially feared. The Bengali "babu," a characterization of the anglicized clerk, received particular scorn, in part because the colonial administration could not have existed without him. In the early days of Company rule, this scorn was based primarily on the perceived religious superiority of the Europeans. By the 19th century, however, scientific and technological superiority had replaced religion as validation for empire. Adas argues that from the Industrial Revolution until the end of World War I, technology became the standard by which civilization was measured. This meant that not only was Europe by definition more advanced, but also that technological progress became "the most meaningful gauge by which non-Western societies might be evaluated, classified, and ranked" (Adas 1989, 144). This is extremely important to our study of the period, for it meant that local knowledge and indigenous technology had no place in the scheme of physical progress. Indeed, Adas argues that the tools of modern technology took on value judgments. Thus, metal, machine labor, science, the synthetic, all were judged progressive; conversely, wood, human and animal labor, "superstition and myth," the organic, were seen as symbols of stagnation (Adas 1989, 144). As Adas concludes, the switch to science and technology as imperial validation meant that "the civilizing mission . . . was more than just an ideology of colonization beyond Europe. It was a product of a radically new way of looking at the world and organizing human societies." In short, the machine became the civilizer (Adas 1989, 209, 221).

This dovetailing of science and technology with the other tools of legitimacy is critical to understanding environmental and social change, for it effectively denies the validity of local knowledge and indigenous technology. Not only were they dismissed, but they were viewed with bemusement and contempt. Rudyard Kipling, as in so much of his work, typifies this attitude in his short story "The Bridge Builders." At the heart of the story is a discussion among the gods within the Hindu pantheon concerning the engineering marvels of the Public Works Department, in particular a bridge over the Ganges River. Krishna says to the other gods: "It is too late now . . . Now my people see their work and go away thinking. They do not think of the Heavenly Ones altogether. They think of the . . . things the bridge-builders have done, and when your priests thrust forward their hands asking alms, they give a little unwillingly" (Kipling 1898, 40).

Kipling's story is telling on several levels. First, it represents the transition from religion to technology as the main rationale for empire. But more than that, it equates Western technology and religion. This equation will play an important role in the development of the European corps of engineers in South Asia, particularly within the Department of Public Works after the 1857 Rebellion.

VALIDATION, IDEOLOGY, AND ENVIRONMENTAL HISTORY, 1793–1857

We have spent the first portion of this chapter defining some of the modes of legitimacy that were used in the conquest and control of India. We now move specifically to the effect of this development on the environment and people of South Asia. Here is one overarching argument to keep in mind. If, as Adas argues, scientific and technological progress increasingly became the gauges for cultural sophistication, the other side of the coin was the increasing perception of the colonies as simply areas for extracting raw material. As such, validating empire became self-legitimizing: Extraction of raw materials led to further industrialization and technocratization, which in itself was proof that India and Africa needed to be colonial possessions in order for Britain (and, by extension, the world) to continue its divinely mandated scientific progression. As this philosophy became accepted in India, subjugation of nature became a legitimizing tool of its own. Just as many saw the Indian people as misbehaving children who needed discipline, so too was the Indian environment. Both needed to be “managed” (Hill 1995, 61–64). To follow the evolution of this attitude and its effect on the subcontinent, this narrative needs to be divided into five general categories: land, trade, public works, disease, and education. Although of course it can be argued that many other categories help explain the changes in the environment, these five general divisions, along with their subcategories, should help to clarify the overarching structure.

LAND

Case Study B analyzes in some detail the changes in the agrarian structure brought about by the Permanent Settlement. To summarize, the Permanent Settlement Act of 1793 was an attempt by Governor General Cornwallis to implement an English-style agrarian system based on his beliefs that private property must be the foundation upon which British India would be built. As was common in the early colonial period, Cornwallis couched the act as a return to the great civilization of ancient India, before corruption and superstition wiped out the base of that society. Cornwallis argued that before the days of oriental despotism, India’s economy had been defined by private landlords; under the Mughals, he claimed, all land was the property of the sovereign and that explained the evils he found in Bengal. The governor-general, believing the zamindars had been the landowning class in ancient times, acted to “restore” them to their rightful property. Overnight, the Permanent Settlement made a small class of

middlemen into the richest class in India. The settlement was made for 26.8 million rupees (£3 million), which at the time was the highest revenue demand in the history of the Bengal Presidency (Marshall 1987, 123). In terms of real value, however, this amount did not last long; because the settlement could not be modified, it could not be adjusted for inflation. This led to a continuous increase in the wealth of many of the larger zamindars, eventually making them and their descendants fabulously wealthy. As long as the zamindars paid the annual revenue, the land remained in their families for the duration of the British Raj.

Conversely, the Permanent Settlement contained no tenancy rights for the peasantry. Until the introduction of the Bengal Tenancy Act of 1885, under which the cultivators gained occupation rights to the land if they could prove that they had tilled the same plot for 12 consecutive years, the peasants could be arbitrarily evicted from the land. With no stipulations for rent and revenue control, the zamindars could settle their land with those peasants willing to work the most land for the lowest percentage of the crops. As the population of the Bengal Presidency reached a level where there were more peasants than land, desperate cultivating families were willing to cultivate for near-starvation wages. As long as the landlords paid the settlement, however, interference was minimal; it usually occurred only when a zamindar died with no adult male heir.

The Permanent Settlement was not Cornwallis's only act that tampered with the revenue system of Bengal. Other aspects of the Cornwallis Code, as it came to be known, restructured the administrative system of revenue collection that affected every layer of the agrarian hierarchy. Cornwallis had a fundamental distrust in the people of India, remarking that "every native of Hindustan, I verily believe, is corrupt" (Metcalf 1994, 24). To counter this, the governor general proceeded to Europeanize the entire administrative and military hierarchy. Henceforth no covenanted civil servant could be Indian, nor could any commissioned officer in the Company armies.

The anglicization of the civil service had major implications on the land and the new tenure system. Young collectors, freshly removed from English schools, were sent out to the mofussil to administer and collect revenue for districts with populations averaging 2 to 4 million subjects. The penal, judicial, revenue, and administrative authority were incorporated into one young Briton, who had only classroom knowledge of the history, society, and languages of India and no working knowledge of his particular district, let alone familiarity with the unique dialect, customs, and conventions of the region to which he had been assigned. Given his ignorance, he was forced to rely on the European civilians (planters and merchants) and zamindars located in the district. In terms of social justice,

this dependency further limited the peasants' access to the vaunted Pax Britannica.

The zamindars in the Bengal Presidency could not be considered landlords in the typical European sense. As Meena Bhargava and John Richards note, "most zamindars confined their management energies and investment funds to a core area consisting of fields under their direct control" (Bhargava and Richards 2002, 237). This energy was usually exerted from afar, as the large zamindars were usually absentee landlords, living in the cities or on their traditional estates. The Maharaja of Darbhanga, whose annual revenue payment of 167,162 rupees made him one of the wealthiest zamindars created by the Permanent Settlement, by tradition would not even visit the large portion of his zamindari east of the Kosi River because of a prophecy warning of the loss of his estate (Sohoni 1962, 131). The Tagore family established itself in Calcutta, arguably becoming the most influential zamindari family in Bengal; Rabindranath Tagore won the Nobel Prize for Literature in 1913.

Why would absenteeism have any impact on the environment? The answer lies in the concept of alienation. Increasingly, these large landlords turned their interests to matters that had nothing to do with agriculture. By the middle of the 19th century the Darbhanga maharajas had become involved in emerging associations such as the British India Association and, as the independence movement grew in popularity, the pro-British Union Party. The Tagores were involved in religious reform and education, establishing Vishva-Bharati University in the town of Shantiniketan in 1921. As a result, the focus of such zamindars was not in nature but in profit. They left the administration of their estates to land managers, often British, who tended to side with the administrative physiocratic view that agriculture was the major source of wealth and should be spread as widely as possible.

The combination of disinterested managers who viewed nature as having little or no intrinsic value, with the commodification implied in the physiocratic notion of land as wealth, led to the virtual disappearance of fallow lands in some parts of Bengal. The official designation of uncultivated lands as "wastelands" was meant to be taken literally. To ensure that all cultivable land was being farmed, by the late 18th century British ethnographers were sent to traverse all the area under British control. These men were much more than ethnographers; along with detailing societal customs and caste and religious identities, they also unofficially surveyed the land, noting how the land was used.

Perhaps the most famous of these ethnographers was Francis Hamilton Buchanan. In 1807, the government appointed him to make a statistical tour of the Bengal Presidency. He spent the next seven years reporting on the people, surveying the land, and making suggestions for "improving" the mofussil. In

1815, ill health forced him to leave India, but his reports and journals had a powerful impact on the Board of Revenue in Calcutta (Van Schendel 1992, xxi–xxv). As he toured the various districts of Bengal, Buchanan became increasingly incensed by all the waste he saw. His anger was not limited to the expanses of uncultivated land he came across; he thought unmanaged forests were depriving the government of revenue as well. The religious custom of planting trees whose fruits were left as offerings to the deities particularly bothered him: “The groves produce the most execrable sour resinous fruit, filled with insects, and were it allowed to be cut the timber is of very little value” (Buchanan 1928, 307). In place of the sacred groves he urged the introduction of teak trees, going so far as to suggest that such commodification of their land be required of the zamindars. As he journeyed farther into the countryside, he urged that tobacco production be encouraged along the marshy areas of the Kosi River and indigo be introduced into the large, grassy meadows. Herds of wild animals were to be thinned out or exterminated to make way for commerce (Buchanan 1928, 303–308, 387, 388–398). Such was the vision for the wild lands of rural India.

This vision was largely fulfilled. In the region of the Kosi River in North Bihar, for example, Buchanan had complained in 1809 that indigo, jute, and tobacco (the primary cash crops of the time) accounted for only 42,633 acres of cultivated land. By 1877 that figure had grown to 164,113, almost quadrupling in size. By 1956, even though indigo had largely disappeared with advances in synthetic dyes, the figure was almost 200,000 acres. All of this was carried out at the expense of the forests, marshes, and animal populations. In the late 19th century the region had been declared by princes and planters alike as the greatest hunting ground in the Bengal Presidency. By the early 1930s, the last stretch of forest that provided habitation for the wildlife was destroyed. Such practices were common in many districts that Buchanan traversed (Hill 1997, 162).

In southern and western India, utilitarian administrators, many with anti-landlord dispositions, interpreted ancient Indian custom differently. Under the leadership of Thomas Munro, governor of Madras, these officials saw not a class that had formerly been the owners of vast swaths of private property but a collection of petty chiefs. The real source of wealth, they argued, lay with the peasants (known as raiyats) who actually cultivated the land. With this in mind, they introduced the raiyatwari system, in which revenue was collected directly from the peasant. Revenue settlements were based on the condition of the land and were subject to new survey and settlement operations at given times, usually in intervals of 10 to 30 years. Even so, in times of drought, flood, or pestilence, the raiyats were often forced to turn to moneylenders, paying usurious rates for loans, and often losing their lands when they could not make their repayments

on time. This led to the appearance of a new class of absentee landlords, similar to those in Calcutta, but located in Madras and Poona instead (Wolpert 2004, 205; Robb 2002, 126–130).

Whether zamindari or raiyatwari, the underlying principle of the settlement was the same: to maximize profit by using and commodifying every acre possible. The impact of this commercialization on the land and the peasants, along with the concomitant change in farming methods and the switch from payments in kind to cash rent, can only be measured in terms of wilderness lost to extended cash cropping and mining (along with many other utilitarian usages), and the tens of thousands of lives lost during times of famine because cash crops did not provide sustenance.

TRADE

Case Study B touches briefly on how the issue of trade affected early Company policy. We now need to look at changes in trade policy, especially the emerging belief in laissez-faire economics and how that policy affected the Indian environment. We will do so by focusing on the issue of famines, which from 1770 to 1857 occurred regularly in Bengal, Madras, Bombay, Punjab, and Jammu, to mention but a few locations.

As David Arnold has noted, change in economic policy represented a “transition from ‘moral economy’ to ‘political economy’” (Arnold 1988, 111). The transition was most influenced by two men, Adam Smith and Thomas Malthus, both of whom took a concerted interest in India as a social laboratory. Arnold suggests that by the middle of the 18th century, European governments were consciously abolishing the centuries-old custom of making certain that their people were fed and that market prices were within reach of the buying power of the peasantry.

In place of the social contract (described in Chapter 4), the government, greatly influenced by Adam Smith’s *The Wealth of Nations*, instituted a free trade policy known as laissez-faire, which translates from the French as “let it pass,” and roughly means the abolition of government interference in free trade. Many utilitarians also heralded laissez-faire, because they believed unregulated competition would lead to lower prices and better quality, which provided the greatest good. Keep in mind, however, that certainly during the imperial age, the concept of the greatest good was focused on Britain, not the colonies. Thus, under the Charter Act of 1833, the East India Company lost its monopolies on the trade of all major products except salt and opium. Although this may have lowered prices in Europe, it did little good for the Indian people.



The East offering its riches to Britannia. Allegorical ceiling piece commissioned by the East India Company in 1777 for the Revenue Committee Room at East India House in London. (British Library/Bridgeman Art Library)

This switch to a political economy also led to a revolutionary change in the relationship between the government, merchants, and the people. In the past, the moral economy had guaranteed the protection of the population; the new policy guaranteed instead the security of the merchants. Increasingly, as prices rose, merchants in India and Great Britain needed protection from the hungry classes. And yet Adam Smith, and by extension policy makers, approved of high prices, for he believed high prices encouraged imports and frugality (Arnold 1988, 110).

In this belief Smith was joined by Thomas Malthus, who was appointed the first Professor of Political Economy in the British academic system; tellingly, that appointment was at the East India Company Training College at Haileybury. In his "Essay on the Principle of Population," Malthus argued that unchecked populations grew exponentially, but agriculture grew arithmetically, meaning

that the global supply of food could never keep up with unchecked population growth. The greatest weapons against this occurrence, he believed, were disease, war, and famine. Malthusian population theory paved the way for the development of a trend, although obliquely professed, of suggesting that famine had a positive and even necessary outcome. Charles Trevelyan, who would become governor of Madras and finance minister in India after the 1857 Rebellion, claimed that the Great Irish Famine (during which he was in charge of Irish famine relief) was a “direct stroke of an all-wise and all-merciful Providence . . .” to provide the opportunity to remold Irish society (Trevelyan 1848, 230).

Malthusian and Smithian economic theory, combined with an essentially conservative governance in India, led to a crooked mosaic of policy. As John Bennett has noted, imperial policy was “set up by a clique of government officials dedicated to the apotheosis of utilitarianism, with graftings of the doctrine of progress, and what later came to be known as the ‘survival of the fittest’ in social Darwinism” (Bennett 1976, 198). Throughout the late 18th and 19th centuries, a policy of strict noninterference was put into place across India. Arnold notes that a Board of Revenue circulation in 1811 forbade interference with trade, arguing, as Smith had, that high prices discouraged gluttony and encouraged private trade (Arnold 1988, 113).

We have seen the arguments for free trade in the abstract, but what were the consequences of such policy for the land and the people? We need only look at the Bengal Famine of 1770 to see the results of early trade policy. The 1770 famine is the most famous famine of Company rule for several reasons. It was the first great famine to occur under colonial rule, and it appeared in the earliest days of Company rule. The famine killed more than 10 million people—one-third of the entire population of Bengal. Finally, as former civil servant W. W. Hunter noted in 1868, it need not have been nearly as deadly had it not been for the actions of the Company itself (Hunter 1868, 17–61).

The roots of the famine can be found in the partial failure of crops in 1768. Despite the smaller-than-average crop, the entire land tax was collected—by force in some places. The next year, as crops again failed, supplies of grain were sent from Bengal to Madras, where they could fetch a higher price. Indeed, economic policy was so focused on high prices and noninterference that in 1770 the land tax was increased by 10 percent. *Laissez-faire* policy meant, of course, that with supply in Bengal low, prices skyrocketed. Cases were reported of grains rotting away because the famished could not afford the prices. Hunter claimed that it represented “an aggregate of individual suffering which no European nation has been called upon to contemplate within historic times” (Hunter 1868, 19).

As we will see in the next chapter, famine increased in the latter half of the 19th century, and indeed the British Raj came to a close with yet another horrendous famine in Bengal in 1943. And yet famine was always a particularly contentious incident for colonial rule, for it was a direct slap in the face of Pax Britannica. How could one reconcile Kipling's famous legitimizing lines of "The White Man's Burden," which called on the colonialist to "Fill full the mouth of Famine/And bid the sickness cease" (Kipling 1989, 321), with famines that routinely killed millions of people? This conundrum would haunt the government until independence.

PUBLIC WORKS

Early public works in colonial India were carried out more for the protection of East India Company employees than for the benefit of the indigenous population. Until 1857, the Royal Engineers were a military unit, and thus their original function was to fortify and make secure the territory that British forces had captured. E. W. C. Sandes's frank admission in his history of the Royal Engineers underlined the original duties of the engineers: "The experience of seventy years was needed to teach the lesson that trade follows the flag, or in other words it must be backed by force and force which is evident" (Sandes 1933 1, 2–3). This meant building fortresses to protect the factories and the purchased goods. A fortified factory was established in Surat in 1612, and Fort St. George, a true fortress, was built near Madras in 1644. These were followed by various fortresses along the coasts and inland rivers, culminating with the establishment of Fort William in Calcutta in 1690.

Actual public works, such as forestry, water management, and communications were either nonexistent or were solely performed for the enlargement of Company coffers. Forestry provides a good example of the early management of India's natural resources. As Madhav Gadgil and Ramachandra Guha note in their environmental history, the destruction of valuable forests was often carried out to symbolize the power of the victorious colonial armies. In the period to 1860, indeed, many in the Revenue Department saw deforestation as a necessary function of government, for it opened new lands for cultivation and revenue settlements (Gadgil and Guha 1992, 118). This dovetailed nicely with the demands back in Britain, where charcoal use had become so prevalent that massive deforestation in England (and the virtual annihilation of Irish forests) led to protection laws as early as 1558 (Fry 2004, 2). The laws were so widely ignored, however, that the Royal Navy jumped at the chance to harvest hardwoods in South Asia.

It was the development of the railway system in the early 1850s, however, that caused a crisis in colonial deforestation. Wooden sleepers, or railway ties, were needed by the hundreds of thousands for tracks that were nonexistent in 1850 but covered 25,000 miles by the end of the century (Kerr 1995, 1). Indeed, the railways had such an impact on the forests that the Madras Presidency used 35,000 trees per year for sleepers alone. As Gadgil and Guha note, the massive deforestation of hardwoods forced the engineers to use weaker woods, some of which only lasted as ties for one-third as long. This vicious cycle meant that weaker species were being eradicated as fast, if not faster, than the more valuable species (Gadgil and Guha 1992, 119–120). As the building of railways proceeded at a rapid pace, the destruction increased. By 1837, Company surgeons had established a connection between drought and deforestation, which once again raised the specter of increased famine. As Mahesh Rangarajan has noted, suddenly the concern for forest protection became a priority (Rangarajan 1996, 23). Even so, the Forest Department was not established until 1867, after the conclusion of the 1857 Rebellion, which had emphasized the strategic necessity of the railway.

Irrigation and water management were to become arguably the most important functions of the Public Works Department. In the first half of the century, however, relatively little was accomplished in the way of canal building. Until 1836, most of the work focused on restoring old Mughal works, in particular the Jamuna Canal, whose importance under Akbar was noted in Chapter 5. The western branch of the canal reopened in 1820, and the Eastern Jamuna Canal was refurbished a decade later.

The first original British irrigation scheme was the Ganges Canal, begun after the famine of 1837–1838, which killed perhaps a million people in North India. The canal, completed just in time for the 1857 Rebellion, stretched some 350 miles from Hardwar, where the Ganges begins its descent onto the plains, to Kanpur in the central plains of the doab. It was the largest canal works in history and the first great symbol of colonial technological supremacy. The environmental affects of this and other major canals will be detailed in Chapter 7.

By the end of empire, public works had changed the shape of India in terms of culture, economy, and environment. Although most of the work was done in the period roughly covering 1860 to 1920, the fundamentals were established under Company governance. As Chapter 7 will show, public works, especially in terms of control and management of water and forests, would mean the difference between life and death for millions of Indian peasants in ways the British technocrats never expected.

DISEASE

Disease was a term that covered a number of ills in colonial India. Issues of health, which were often attributed to climate, were used as a justification for British control; they provided an excuse for cancelling events (such as fairs) the government believed were potential sites for insurgency, and they were major factors in the intentional separation of the rulers from the ruled. Disease exemplifies the use of the environmental to alter the social.

In the 17th and 18th centuries, the focus on disease was directed toward its effect on the Europeans. The perceived natural inclination of Bengalis toward laziness and fatalism was attributed to the climate of Bengal, which was the region the merchants knew best. India's environment was thus to blame not only for physical illness but social disease as well. It was all the more important, then, for Britain's guardians of India to maintain a distance from the sources of illness.

In truth, the early Europeans in South Asia had much to fear. The common belief that "two monsoons comprised the life of a European in India" was based on fact, for if a Briton could survive through two rainy seasons, he or she would normally develop the immunities necessary for a long life in "the tropics." Theon Wilkinson claims that in the early years of the Company in India, the average age for merchants was under 30, while that for European women was under 25. In some areas the death rate was more than 50 percent for the first two years (Wilkinson 1987, 6). Ironically, public works tended to exacerbate the unhealthiness of certain areas. Railway embankments interfered with drainage, and canals sometimes led to flooding in the fields and outbreaks of malaria.

Disease was also a factor in the colonial concept of "difference" noted earlier in this chapter. Residences were chosen very carefully, for altitude, humidity, moisture, and earth all factored into issues of health. The presidency governments moved to "the hills" during the summers, for life on the hot plains, as Metcalf notes, would, according to colonial medical prognosis, "lead to an enfeeblement announced by languor, irritability, and depression" (Metcalf 1994, 171–185). The main hill stations were designed to be as English as possible, so much so that some did not see the hill stations as "really part of India" (Allen 1975 129). The native population was limited to the minimum necessary for the station and government to function. Indeed, the facade of an English village was considered part of the cure from the plains; as 19th-century viceroy Lord Lytton wrote, the hill stations' climate provided "such beautiful English rain, such delicious English mud" (Metcalf 1994, 184).

Darjeeling, the hill station for Bengal, provides a nice example of how climate and place affected colonial views of nature. Situated in the lower



The "toy train" at Agony Point en route to the hill station of Darjeeling. (Library of Congress)

Himalayas, Darjeeling posed a problem of transportation. Regular railway tracks could not be built, so the journey to the station included a stretch on the "toy train" that circled around the mountain much like a child's electric train circles a cardboard dome. Once arriving in Darjeeling, the British began to feel invigorated, thanks to the fresh air, cold breezes, and numerous walking excursions. With an elevation too high for the disease-carrying creatures of the plains, the British found the hill station "clean and healthy." As at most hill stations, boarding schools for those imperial children who did not return to Britain would be found. The point was to provide an experience that mimicked the British climate as closely as possible. At least one school in Darjeeling located the latrines away from the dormitories to expose the boys to the cold, invigorating air as much as possible. By the time the summer ended, most European civil servants felt ready to face the tedium, heat, and humidity they found in the riparian plains of Bengal.

Fears of disease also defined the living arrangements in the plains during the hot weather. The common bungalow (from “Bangla,” or “of Bengal”) contained servants’ quarters along with family living space. The servants’ quarters were situated away from the main house within a compound that was set back a distance from the road. The compound was usually surrounded by hedges or a fence, with an English-style garden filling the yard. In this manner the servants were kept away from the squalor and “filth” of the city. Cities were often divided into the “old” and “new” cities, with Civil Lines incorporating the European neighborhoods. This separation provided racial distancing in the name of health.

Fears of contagion, while real enough, also provided the opportunity to underline colonial power and control. The administration feared annual melas, which were fairs or religious gatherings, more than any other type of community celebration. Although pilgrimages certainly were sources for the mass distribution of disease, they were also, the British believed, the nuclei of insurrections and rumor spreading. The Sonapur Mela, held annually at the juncture of the Ganges and Gandak rivers, provides a nice example of how the British viewed these fairs, in terms of both health and authority. Beginning in the late 18th century, the British scheduled a “meet” to coincide with the mela, which conveniently fell during the Christmas season. Although officially the gathering of administrators was organized for crowd control and disease prevention, it became, to use Anand Yang’s phrase, a “metaphor of control” (Yang 1989, chapter 1). As happened in many subjugator/subject societies, disease became a legitimizing factor for a show of force and, if need be, imprisonment disguised as quarantine.

The medical profession’s evolution paralleled that of the Company. Surgeons came out with the early merchant ships and became residents as the factory system grew. The Indian Medical Service (IMS) developed out of the need for doctors to service the various European communities in South Asia. As with the Indian Civil Service, the higher ranks of the IMS were reserved for Europeans. The lower ranks (subassistant surgeons, apothecaries, dressers, and the like) were open to South Asians, if only because there were not enough Europeans to carry out all the services. Ayurvedic, or traditional Hindu medical practices, were looked on much the way other aspects of Indian civilization were viewed. In the early days of colonialism, Orientalists such as William Jones believed indigenous herbal use could be studied as an effective way to treat the mystifying diseases that the British encountered in this period. By mid-century, however, most European medical officers saw Ayurvedic practices as a form of superstition and the antithesis of modern medicine. Because the service had been established by

and for Europeans, local treatments and practices were once again demeaned. The ramifications of this will be seen later.

EDUCATION

The education of the colonial civil servant was critical in molding his attitude toward the South Asian environment. The Eurocentrism that had such a vital impact on nature and society in colonial India came out of an education system that was predicated on the assumption that Western knowledge was the sole source of modern science, technology, and civilized action. As such, an education undertaken in schools and colleges located in the West was essential for acquiring the tools necessary to rule the world. This belief was so widespread that some of the most able servants of empire were ignored or dismissed because they had been educated at colleges in India. Such an attitude affected ecological change across South Asia. To name but one of the consequences that we will investigate later, ignorance of local ecosystems led to poor irrigation that in turn encouraged the spread of waterborne diseases, soil erosion, mudslides, and catastrophic floods.

As he did with the revenue and administrative system, Cornwallis began the process of eliminating corruption within the appointment process of East India Company employees. Although patronage continued to be the primary avenue for appointment, the demand for an educated body of civil servants led in 1800 to the opening of the College of Fort William in Calcutta. Under the guidance of Richard Wellesley, the governor-general at the turn of the century, the college was intended to provide a general European education for the newly arrived civil servants. One of the purposes of emphasizing a Western education, the provost of the college argued, was to build a wall between the civil servant and his Indian subject whose "general character is imbecility of body and imbecility of mind [which] seems at present to be bound by a Satanic spell" (Cohn 1987b, 532). Even so, the college was superseded by one in England. The East India Company College at Haileybury opened in 1806, with Malthus heading the faculty as a professor of history and political economy. The college continued the practice of emphasizing Western subjects at the expense of a grounded knowledge of India. Besides the sciences, English law, French, composition, and mathematics were required courses. In addition, an "Oriental Professor" was hired to teach Indian history and languages. However, the first professor of oriental languages resigned before the college opened, arguing that his lesser salary symbolized the superior position of Western learning to education about South Asia (Cohn 1987b, 526–530).

Indian education revolved around courses in Sanskrit, with some Hindi and Bengali, which were of questionable value at the local level in North India and of no value in the south, where the languages were Dravidian-based rather than Sanskrit-based. As George Campbell observed, Sanskrit was as useful to a district officer in India “as a knowledge of ancient German would be to an English Commissioner of Police” (Cohn 1987b, 532). As long as Haileybury’s doors were open, Indian history was delivered through James Mill’s six-volume *History of British India*.

The mode of education at Haileybury and the courses taught tell us a great deal about the purpose of the college. Students at Haileybury were judged more on their “can-do” spirit and esprit de corps than their academic accomplishments. As Bernard Cohn has noted, the primary purpose of the college was to produce Company employees who would develop “peer relations with a group with whom they were to spend their lives working; they also assimilated a set of values relating them to their fellow students rather than to India, or even to Britain, or to the service of which they were members” (Cohn 1987b, 544).

The ramifications of this Eurocentric education, with the graduates’ loyalty focused on their fellow Haileybury students, are not difficult to see. Early postings in India were routinely in the mofussil; district officers worked their way up to urban positions. As such, they were placed in areas where expertise in the district’s environment, social hierarchy, customs, and of course languages were immediately crucial to administration. In many, if not most, cases their education prepared them not at all for the situations they were to face. Indeed, the more difficult the district’s reputation for management, the more likely it would be assigned to freshly arrived junior officers or to incompetent or corrupt civil servants who were sent there as punishment. The district of Purnia provides a good example. Purnia’s reputation as a disease-infested jungle made it perhaps the least-desirable posting in the Bengal Presidency; as John Beames, who was district officer in Purnia in the mid-19th century, observed, “the Government has the habit of reserving some of the unhealthy districts as ‘penal colonies’ to which they send any man whom they wish to punish” (Beames 1961, 133). The junior officer in particular was unprepared for such postings. With little or no knowledge of the language and terrain, he was dependent on those who knew the area and with whom he could converse. In general, his advisers turned out to be educated zamindars or European planters, all of whom had their own particular interests. As Case Study B reveals, when a district officer depended on zamindars for translation and local advice, the peasant population had no representation and was often the recipient of rack renting and illegal revenue demands.

Planters in particular were virtual autocrats in their districts, for the district officers often deputized them as assistants, particularly in those areas where transportation was difficult. Anand Yang has noted that the British administration was at best a "limited raj" (Yang 1989) that was "caricatured in the image of the local British officer riding across the mofussil to 'meet' his two million subjects" (Yang 1976, 132). As a result, indigo planters wielded a great deal of power in the jungle areas of North Bihar. The planters would convince peasants to switch from growing food crops to planting indigo by advancing them a pair of oxen, a plow, and seed. They would then draw up contracts in which interest rates of 30 to 40 percent were not uncommon. The contracts further stated that if sufficient indigo was not produced, the planter had the right to plow up the cultivator's other crops and plant indigo, by force if necessary. In fact, if not in law, the indigo raiyat became a debt slave.

The jungles also became havens for dacoits and rebels throughout British rule. It was virtually impossible for district officers to traverse the jungly portions of their districts. Although it might be feasible to travel through the region by elephant, the wild animals provided such a hazard that few Europeans were eager to "meet" their subjects in those areas. To give but one example, in 1840 approximately 100 dacoits robbed the houses of the richest merchants of the town of Nathpur, absconding with more than 3,500 rupees. By the time the police arrived, the thieves were long gone. Nathpur was located along the Kosi River, with convenient access to the nearby uncleared jungles. Such access made the Kosi region a convenient "Sherwood Forest," which the local police often could not or would not enter. Because the district officer knew little to nothing about the jungle regions, and often had to rely on others to communicate with his employees, he was unable to apprehend these bandits. This was not a unique case (Hill 1997, 71–72).

Education in England proved to be of questionable use in the local arenas of colonial South Asia. In the early 19th century the impact of this was essentially limited to incompetence in direct administration of the local environment and subsequent weakening of agrarian rights for the peasantry. In the second half of the century, however, with colonial emphasis on technology and public works, the effect of Eurocentric education on the environment would be farther reaching.

THE 1857 REBELLION

By 1857, the British were in the midst of a military modernization campaign. Among the changes was the introduction of the Enfield rifle, which could be

loaded and fired much more rapidly than earlier weapons. The Enfield, however, was a muzzle-loading weapon, and its ammunition had to be bitten off at the top and then forced into the barrel. To enhance rapid loading, the cartridges were greased, originally with the fat of cows and pigs. No other substance could have offended the vast majority of the Indian Army as much as these two could. Instead of responding by changing the lubricant to vegetable oil, the Company decided to respond with discipline. Unit after unit was court-martialed after refusing to load the rifles; the sepoys were then either imprisoned or dishonorably discharged and sent back to their home provinces. Some believed the whole affair was an attempt on the part of the Europeans to bring about conversion through defilement. Many also believed the officers of the Indian Army had broken their unwritten contracts with the sepoys, one that promised the soldiers lifetime security in return for loyalty (Nayar 2007, 1–33).

In May 1857, in the North Indian city of Meerut, the anger evolved into rebellion. On a Sunday, while the British were in church, the sepoys mutinied and attacked their officers and the officers' families. They then turned to Delhi, which was about 40 miles southwest of Meerut, with the stated intent to return the Mughal emperor to power. The cry of "*Delhi chalo!*" ("Let's go to Delhi!"), which became the anthem of the insurgents, would resonate again in World War II, when another attempt was made to drive the British out of South Asia. The rebellion then spread rapidly across the Gangetic Plain, reaching from Punjab to Bengal. The British suffered major defeats in the early months, but by July 1858 the rebellion was for all intents and purposes over. The fact that sepoys in South India and Sikhs in the north had in general not rebelled, combined with the critical strategic advantage of controlling the fledgling railway, post, and telegraph services, saved the British Empire from losing its greatest colony.

Debate still continues as to the causes and extent of the rebellion. The British maintained that it was nothing more than a sepoy mutiny, but early nationalists claimed it was the first war of independence. In fact, it was neither; the rebellion spread well beyond discontented sepoys. In a direct action caused by the Permanent Settlement and the environmental changes that came with it, peasants across North India took advantage of the rebellion to burn the zamindar record offices, where the logs of revenue demands and back payments were kept. Even contemporaries in Britain, such as Benjamin Disraeli, who as prime minister would be the most ardent advocate of imperial expansion, admitted that the events of 1857 encompassed much more than a simple mutiny.

Neither, however, was it a war of independence. Because the Meerut rebellion happened spontaneously, there was no organized leadership for the insurgency. Although leaders did appear—most notably the Maratha Nana Sahib and the Rani of Jhansi (the "*Joan of Arc*" of the rebellion)—they were regional figures

and did not command a subcontinent-wide following. Perhaps this is why South India did not involve itself in a full-fledged insurrection. Similarly, the Sikhs, whose distrust of the Mughals was intense, were not going to involve themselves with a movement with a stated intention of returning the Mughal emperor to the throne.

Other theories abound. Some said it was a Muslim plot; others suggested the brahmans were to blame. Fear of technology was advanced as a theory, while Marx claimed the rebellion was a response to the destruction of the handicraft industry in Bengal (brought about by industry in Europe). It was even seen as a Russian plot. One of the early modern historians of India, Percival Spear, argued that 1857 was the final attempt by traditional India to stop the onslaught of the West. Finally, S. N. Sen, who on the centennial anniversary of the rebellion was commissioned by the government to write the "official" history of 1857, claimed that the events were inevitable given that the governing body of Europeans had virtually nothing in common with the subjugated masses. As already shown, there were no shared languages, culture, or religion, and the British did little to nothing to demand that civil servants be familiar with India; the education system emphasized "spirit," not knowledge or understanding.

For the purposes of this discussion, however, it is not crucial to find the cause or causes of the 1857 Rebellion. Its importance lies with the changes in ideology and policy to which it gave birth. Gone would be the utilitarian emphasis on the great moral duty of turning South Asians into "brown Englishmen." The government instead would focus on that which had brought the British to India in the first place: precious goods and raw materials. It is not a coincidence that the newly formed Public Works Department, which took control of commercial engineering and scientific forestry while consigning the once-powerful military engineers to military construction only, would become the focal ministry of advancement at the conclusion of the rebellion. The last century of British rule would be marked by drastic changes in the environment of India, with the engineers from the Public Works Department on the front lines. Canals, railways, scientific forestry, and the like were to become the new purpose of empire, while social legislation, evangelism, and Indian education would take a back seat. As a result, famine increased, peasants lost livelihoods, rivers flooded in ways that they never had before, and old-growth forests were decimated. In very real terms environmental change, instigated by a dramatic increase in drain of wealth, spread dissatisfaction throughout the empire to an extent that the East India Company could not have imagined in 1857. Due in part to the changing nature of environment and society during the last 90 years of British rule, India would launch a campaign that encompassed the entire nation and would lead to independence in 1947.

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IMPERIUM, 1858–1947

As we noted in Chapter 6, 1858 marked a watershed period in modern South Asian history. These post-rebellion changes were disparate and permanent. In the wake of the rebellion, disillusionment and suspicion of the others' motives were heightened. The concept of "difference," as defined by Thomas Metcalf in Chapter 6, became the main legitimizing factor for empire. The utilitarian rationale, best expressed by Macaulay, that "come what may, self-knowledge will lead to self-rule, and that would be the proudest day in British history" (Macaulay 1833, 718) disappeared. In its place came the twin pillars of post-1857 empire: racial divisiveness and rapaciousness.

The immediate changes in administration after 1857 were more cosmetic than real. Gone were the Mughal Empire and the East India Company, both of which became convenient scapegoats for the insurgency. Company rule was officially replaced by that of the crown, but the infrastructure remained the same. The title of viceroy was added to that of governor general, but as a symbol of continuity Charles Canning remained in both roles. In 1860, Queen Victoria announced that the empire had no more territorial aspirations in India (although no such guarantees were made for Afghanistan, Burma, or Tibet).

Crown policy at this time was driven by the belief that the Company had not deciphered popular opinion and thus was unprepared for the rebellion. In 1861, the administration set out to make certain that such a miscalculation would never happen again. The first move was to reward those who had remained loyal. Sikhs quickly came to the forefront in the Indian Army; they eventually composed more than 20 percent of the military even though only 2 percent of the population was Sikh. For a brief moment the government considered implementing the Permanent Settlement across India; this idea was quickly discarded, however, because of the loss of revenue that accompanied the settlement, which the administration had realized only too late in Bengal. Instead, honorary titles, knighthoods, and offices became the reward for zamindari loyalty. In truth, the zamindars had been loyal by necessity, for the end of empire would spell the official demise of their landlord status. Finally, the Indian Councils Act of 1861 established a 15-member council to advise the viceroy on internal affairs. The

council had no power whatsoever and represented only the English-educated class of zamindars and princes; for the first time, however, Indian voices were in theory taken into account, although much of the process reeked of tokenism.

The most expansive changes were seen in the military. The first signs of “divide and rule,” which would dictate policy until the end of the Raj, were established here. Regiments were divided by caste and religion, in the hope that if one mutinied, the others would remain loyal because they would mistrust the motives of those who rebelled. In addition, the number of British soldiers was raised to half the number of Indian sepoys. Heavy artillery was henceforth to be operated only by British troops. Finally, the most insidious change concerned the development of the notion of “martial races” and “nonmartial races.” According to this policy, certain castes, religions, and tribes were more warlike than others. Even though Bengal had seen less rebellion than provinces to the west, Bengalis were considered too “effeminate” to make good soldiers. Muslims, Sikhs, and northwestern Hindu *jatis*, on the other hand were considered martial. The defining characteristics were completely spurious: meat eaters, hunters, groups that wore pants instead of lungis or dhotis (similar to the lungi but formed by a straight piece of cloth rather than a tubular one), all indicated virility according to this policy. Nonetheless, the stereotypes stuck; indeed, they were a factor in strategic planning for later wars between India and Pakistan.

As we have seen, one of the major justifications for empire was the introduction of social legislation. After 1857, such attempts at “civilizing” the population through government edict virtually disappeared. Again, the Company was blamed for not paying closer attention to custom and religious concepts. Although social reform organizations were formed in both Hindu and Muslim communities, for 35 years the Government of India ignored any attempts by these organizations to demand legislative reform. Only the passage of the Age of Consent Act of 1891, which raised the consensual age for marriage from 10 to 12, interrupted this administrative pattern (Sarkar 1983, 71). Ironically, these indigenous reform agencies formed the nucleus of the early nationalist movement in India.

Finally, the most sinister change came in the area of racial relations. Although racism had always played a role in imperialism, after 1857 it influenced policy in ways that were much more ostentatious than in previous times. Separation of the races became the major consideration when building new European neighborhoods. Civil Lines, often modeled after villages in England, were built adjacent to military cantonments, providing a sense of security and distance from the South Asian population. The only members of the local population allowed to enter were those necessary for the social standing of the Europeans—servants, craftspeople, and the like. But not all responses to 1857 were so genteel. The Indian Arms Act of 1878 prohibited any native of India from carrying a gun

without written governmental approval. Between the time the act went into effect in 1880 and the turn of the century, some 81 shootings of South Asians by Europeans were recorded; in each case the shooting was ruled an accident. Incidents of racism in the military became more common, culminating in 1903 with the gang-rape of a Burmese woman and the murder of a cook who refused to pimp for the soldiers. Although both groups were punished, the reaction against publicizing the events was furious. Increasingly, a siege mentality arose among the British community, whereby any suggestion of a chink in the armor of superiority had to be smothered (Sarkar 1983, 22–24).

Two of the more notorious examples involved the Indian Civil Service (ICS). In 1853, the appointment system of the ICS was changed to one based on competition; for the first time Indians were eligible to test for entrance into the service. However, the scheme was so arduous that it effectively excluded all but one South Asian for its first 15 years. In 1869, however, Surendranath Banerjea, along with three other Indians, passed the exam. Banerjea was subsequently accused of lying about his age and was dismissed from the ICS before his career began. He returned to England, arguing before the court that he had dated his birth from conception, as was the Hindu custom (which the government certainly knew after 200 years of close contact). Banerjea's appeal was successful, and he received an appointment in Sylhet, along the northeastern border of Bengal and Nepal. He was soon dismissed on a technicality, but suspicions that the dismissal was racially motivated swept across India, and provided a motivating symbol for the nascent nationalist movement. Banerjea subsequently became one of the early leaders of the nationalists, speaking out against British racist tendencies across India.

The watershed event that became a direct catalyst for the creation of a nationalist organization was the introduction of the Ilbert Bill. Named after the law minister who introduced it, the Ilbert Bill proposed to address the problem of the lengthy process for criminal trials of Europeans. In 1858, Queen Victoria had reiterated the official policy of basing promotion on ability only; religion and race would henceforth play no role in advancement in the ICS. Under law, however, Europeans were also given the right to stand trial before a European judge. As the more equitable process took hold, more Indians were becoming district magistrates, giving them judicial power in the mofussil, where those affected were civilians rather than government employees. Under the law at that time, these private citizens could demand trials before British judges in the presidency cities of Calcutta, Bombay, and Madras. The process of making certain that defendants and witnesses arrived in the city on the prescribed day was drawn out and expensive. The Ilbert Bill would have abolished the right of Europeans to be tried by British judges.

The reaction to the proposal made it obvious to everyone that the issue was going to be debated on racial terms. European civilians were particularly harsh in their depiction of South Asians, but they were not alone. Not for the first time, one of the key defenses by those opposing the bill was the protection of white women from South Asian men who could not control their lust. Annette Beveridge's response to the proposed bill is indicative of this reasoning. Taking her cue from the argument that women would be at the mercy of lascivious Indian judges, she fell back on the 18th-century practice of describing India as a land and people "where at every point the fact of sex is present to the mind" (Metcalf 1994, 212). The outcry on the part of the Europeans who would be affected by the bill was so harsh and strident that the government finally presented a bill so diluted as to be unrecognizable as the original Ilbert Bill. The ultimate irony of the defeat of the legislation came about only two years later, when, in response to many of the incidents noted, 73 men gathered in Bombay for the first annual meeting of the Indian National Congress, the organization that would lead the Indian independence movement.

THE NEW POLICY

As Metcalf observes in his study of colonial ideologies, one of the results of the Ilbert Bill debate was the appearance of social Darwinism. This argument, as explicated by James Fitzjames Stephens, claimed that force, not moral persuasion, had built the Raj. As a result, it was no use to pretend that the British had come to carry out "the white man's burden." The conquest itself was proof that the imperial power had the legitimacy to rule (Metcalf 1994, 210). Instead of continued hand-wringing and attempts to complete Macaulay's mission to turn the subcontinent into a land of "brown Englishmen," the imperialists should return to their original reason for conquering India: wealth.

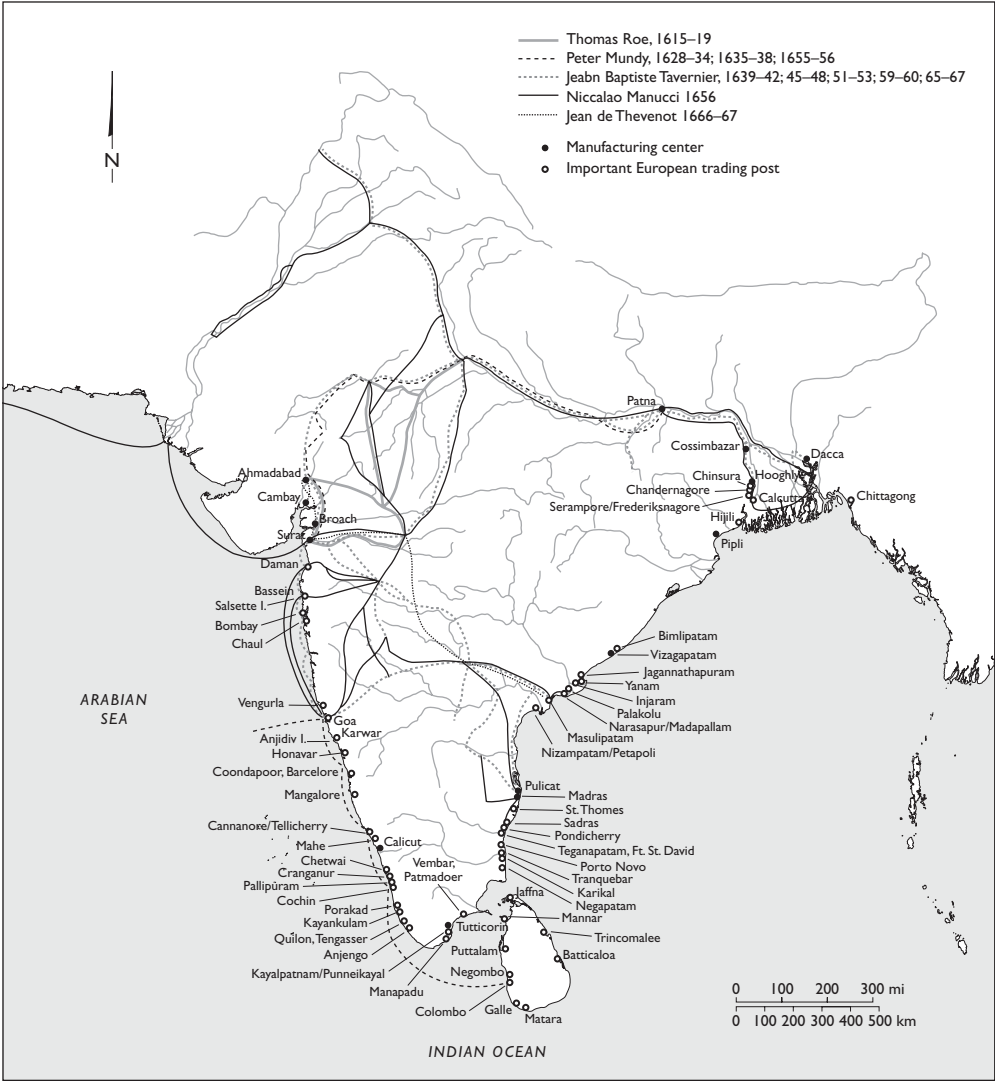
That is precisely what the administration did. The first obligation of the Government of India was to pay the British treasury the entire cost of the rebellion, which amounted to some £36 million. This was carried out in part by a rapid increase in the collection of revenue, brought about by further clearing of "wastelands," and selling or rewarding the land to the European planters. North-east Bengal became a commercial center for tea, and in Bihar indigo plantations began exploiting their workers to such an extent that insurrections broke out across the region. The effect on the environment in these areas, as noted in Chapter 6, was tremendous; the habitat of the region's most famous animal, the Bengal tiger, was virtually wiped out. With deforestation came increasing siltation of the rivers in the presidency, causing many of them to become sluggish



Cutting and loading indigo in 1877. (Science Museum/SSPL/The Image Works)

or, conversely, to rapidly change channels, sometimes annually. Siltation would later become a principal concern in marking boundaries in East Bengal at the time of independence and partition.

The cotton industry in particular was transformed. Homespun cotton cloth, known as khadi, had been one of the products that had drawn the East India Company to India two centuries earlier, but it now was fatally endangered by the introduction of European cotton factories. In 1861, according to Stanley Wolpert, Bombay had eight cotton mills; by 1900 that number had risen to 200, producing half a billion pounds of yarn (Wolpert 2004, 245). Very little of this production benefited India, however. The yarn, which was made very cheaply, was shipped back to England, where the factories in Lancashire turned it into cloth. The finished product was then shipped back to India, where artificial excise taxes had the effect of making the British cloth less expensive than khadi. The “drain of wealth” theory, which became such an important factor in the nationalist and independent movements, emerged from the example provided by the cotton industry. Raw cotton was grown in India, but the profit from that cotton went to British coffers. The finished product was then sold back to India



European–South Asian commercial contacts, 16th to 18th centuries.

(through an economic sleight of hand), and that profit also returned to Britain. As a result, all wealth from the industry was draining out of South Asia into Europe, and there was no balance in trade. As many Indian nationalists would effectively argue, nothing emphasized the hypocrisy of the colonial policy of “free trade” as did the cotton industry.

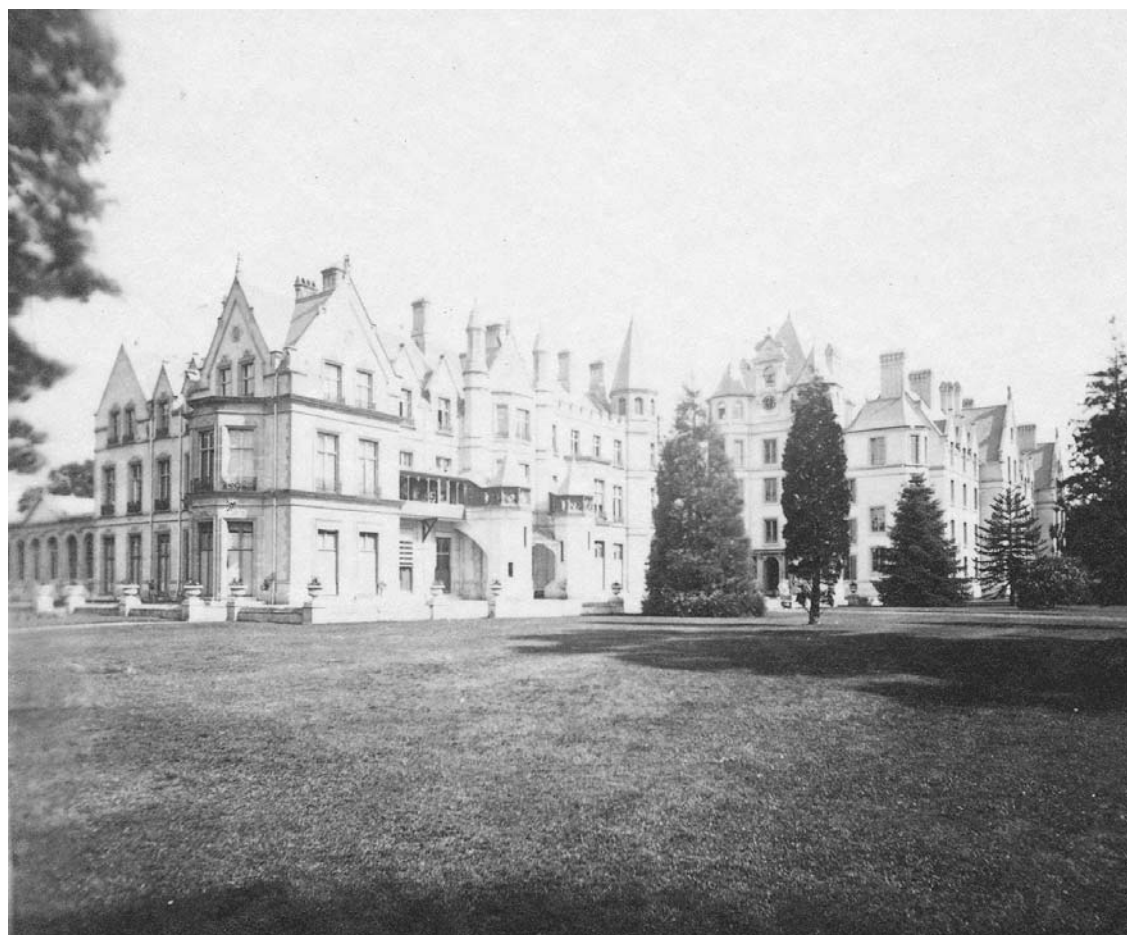
Economic policy was increasingly based on a view of India as a source of raw materials and a market for finished products, and little else. To smooth the way for this transition, technology became the new mantra. The outcome of the 1857 Rebellion had underlined the importance of the telegraph, post, and railway. Now commerce would further increase the reliance on new technology. Thousands of

engineers were needed to build railways and construct irrigation works. Hundreds more were needed for forest management and to oversee the timber industry. The type of engineer the government desired was not readily available in India; junior technocrats had to be trained in Britain, where European scientific and technological expertise would allow them to mold South Asia's environment. As a result of these men and their labors, the landscape of South Asia saw a radical transformation. To give this transformation the scrutiny it deserves, we must once again observe the disparate categories that played a role in changing the relationship between nature and society. The following sections will concentrate on education, railway construction, forest management, public works, health, and famine in the period from 1860 until independence.

EDUCATION

Another victim of 1857 was the East India College at Haileybury; in this case, however, the closing of the college in 1858 was coincidental rather than a result of the rebellion. In 1853, as noted, entrance to the ICS changed from a system of patronage to one based on ability, as measured by an examination. As such, Haileybury had outlived its usefulness. Students could now attend one of many colleges that offered training for the newly competitive ICS. However, although these replacement institutions adapted to suit the needs of the ICS, none of them had engineering schools.

The demand for engineers, however, grew at such a rate that it exceeded the number of graduates produced in England. In 1854, the Public Works Department was established as a new, civil branch of government; as such, military engineers were no longer available for nonmilitary engineering tasks. At the same time, for reasons relating to the change in policy after the rebellion, the demand for engineers increased enormously and suddenly, from 113 in 1840 to 545 in 1863. In 1868, the demand from the Public Works Department was 80; the number of engineers available was 10 (Cameron 1960, 5). Although at the time there were no civilian engineering colleges in England, there were several excellent colleges in India, most notably the Thomason Civil Engineering College at Roorkee, in the United Provinces, founded in 1847. Yet, as we have seen, colonial officials viewed an education received in India rather than in Britain as having little value. This was best expressed by the main proponent for a new college in England, Col. George Chesney: "Roorkee labours under the drawbacks of climate and distance from the great centres of scientific and professional movement, and those of its pupils who have been born and educated in India, necessarily start at a disadvantage compared with those young men brought up under the



The Royal Indian Engineering College at Coopers Hill. (Oxfordshire City Council)

influence of European civilization" (Chesney, undated). This attitude had a great impact on India, for it meant that engineers who had direct knowledge of the South Asian environment would be passed over in the hierarchy of civil engineers.

The government originally tried to address the scarcity of engineers by copying the civil service and introducing an exam system. In 1858, the first batch of "Stanley's Engineers" (named for the secretary of state for India who proposed the change) passed the examination. Unfortunately their number never amounted to more than 10 per year, which of course was far too few to serve the vast designs of a wholly commercialized empire. In light of this vacuum, a proposal for a Royal Indian Engineering College was advanced.

The proposal immediately faced sharp opposition, particularly from the military, who thought losing control of civil engineering would be accompanied by the weakening of their own engineering college at Addiscombe. Engineers

educated in India were likewise upset, knowing that the college would demand that its graduates receive the senior positions in the Public Works Department. Their spokesman was William Willcocks, one of the greatest figures in imperial engineering, who designed the original Aswan Dam in Egypt, and who knew riparian Bengal better than any other contemporary British engineer. As he noted in his memoirs: "The handing over of all . . . privileges to [the Royal Indian Engineering College at] Coopers Hill . . . did good neither to England nor to India. The English students who went to Coopers Hill could have come out . . . and taken their chance against the pick of Roorkee" (Willcocks 1935, 33). In spite of the opposition, the formation of a new college was approved, with Chesney as its first president, and in 1870 he found his perfect location for the establishment, some 20 miles from London. In 1872, the Royal Indian Engineering College at Coopers Hill admitted its first 50 students.

The general education at Coopers Hill was modeled on that at Haileybury: mathematics, chemistry, physics, geology, and the history and geography of India were all required. Added to these were the specialized courses required of an engineer, such as the mechanics of engineering, mechanical design, construction, architecture, and surveying. Practical training was emphasized as well. In 1877 a fourth year was added to the program, taken after final examinations, when students were assigned to public works projects across England, rather than in India itself. In 1878, the college added a school for telegraph training, and in 1884 the first school for Indian forestry students opened, with Dr. William Schlich, the second inspector-general of forests in India, at its head. By then the college was declining; its potential students were being lured away by newly developed professional schools at the established universities. In 1906 it closed its gates. During the time of the college's existence, it had supplied 764 appointees to the Public Works Department, 84 to the Telegraph Department, and 162 to the Forestry Service. Coopers Hill graduates would continue in the Public Works Department until independence.

Why is Coopers Hill important to our understanding of South Asian environmental history? The answer can be found in an editorial printed in the London newspaper *The Spectator* at the time of the college's inauguration. The piece reflects not only the popular sentiment of the era but also the college administration's own view of its purpose:

The ideal Engineer for India . . . can build anything from a Tanjore [water storage] tank as big as the lake of Lucerne to a cloaca [sewer] for the last new stockade; who will regard an offer of a commission from sub-contractors as a deadly insult; who can keep accounts like a bank clerk, and who, with all that, has a special professional pride, differing alike from that of his English and American counterpart.

We have discussed in earlier chapters how such Kiplingesque caricatures helped legitimize colonial rule, so we need only note here that to the faculty at Coopers Hill the engineer defined by *The Spectator* was not an exaggerated figure. Coopers Hill was meant to produce the idealized engineer, racing across the mofussil to fill starving mouths and end disease by building a makeshift dam overnight or draining a malarial swamp. The kind of man Coopers Hill would produce, much like that envisioned at Haileybury, would be a romanticized image of the empire. In short, he would have *grit*.

Grit was the term coined by the second president of Coopers Hill, Alex Taylor, to describe the quality “his boys” would develop from their education at the Royal Indian Engineering College. Grit was a combination of concepts. Bravery, chivalry, personal honor, *esprit de corps*, the “can-do” attitude noted in *The Spectator*’s editorial, these were all aspects of this ideal; so too was the belief in what has been called “muscular Christianity.” Taylor claimed that the essence of this spirit was “beyond the reach of lectures, laboratories, and examinations, but not beyond the reach of *esprit de corps*” (Taylor Vol. 2 1913, 288–289). Taylor’s administration at Coopers Hill received some criticism for its emphasis on “producing English Gentlemen” (Sandes Vol. 2 1933, 352). In general however, his belief that attitude was more important than technical knowledge endeared him to his students and to the government.

Taylor’s emphasis on style over substance had a severe impact on railway and hydraulic engineering in South Asia. By its very position of importance, grit expressed the superiority of Western education over local knowledge. The years at Coopers Hill were meant to be the defining ones of the engineers’ careers, and indeed they were. Carleton Tufnell, president of the Coopers Hill Society, recalled in 1927 how *esprit de corps* lingered when the lessons of education were forgotten. Commenting on the yearly reunions of the college’s graduates, he observed that “there have rarely been meetings of men, united by a link of brotherhood, who have so persistently harked back to a single memory of their lives in an equally strong degree” (Tufnell 1927).

Once these young engineers arrived in India, they faced many of the same challenges that Haileybury’s graduates had faced earlier in the century, but arguably with more serious consequences. All their training had been in Europe, including any practical experience. If they had worked on water projects, they were along rivers whose flow was consistent and predictable. Railway training similarly occurred in regions with no monsoon season, with no hellishly hot summers, and that did not traverse deserts and some of the highest mountain ranges in the world. As such, Coopers Hill graduates were more dependent on the expertise of engineers familiar with the local environment than perhaps any novice engineers outside the empire. Yet they were trained not only to ignore

local knowledge but also to be contemptuous of those who had such training. The impact of such ignorance, combined with an undeserved technical arrogance, played a role in the deaths of thousands of peasants across the subcontinent.

RAILWAYS

The development of the Indian railways provides a nice example of the problems entailed in building a system with a staff whose knowledge of engineering was Eurocentric in both planning and purpose. Although the railway system has been held up for the past century as the primary example of colonial beneficence to South Asia, the reasons for its construction are more complex than such a claim would suggest. There is no doubt that the railways were, in part, built to ease the hardships on the population. In 1880, after some 20 years of a particularly lethal series of famines, the Famine Commission ordered 20,000 miles of new lines to aid in transporting food to the afflicted areas. As David Arnold notes, this was in direct contravention to the official policy of noninterference with trade in times of famine (Arnold 2000, 108). The new, rapid method of transportation and communication also helped to ground the sense of nationalism that arose in this period (although it is unlikely that the government saw this as a benefit!). For the most part, however, from the beginning of the railways in South Asia, the majority of the benefits accrued to Great Britain. With the exception of a brief period in the 1870s, the railways were owned by private interests; although a few were owned by princes in their own princely states, the rest were owned by partnerships established back in Britain, with the East Indian Railway Company and the Great Indian Peninsula Railway Company leading the way. From their early existence these companies were guaranteed an annual profit by the government (Thorner 2001, 81).

Problems surfaced early, especially because the companies were given a virtual *carte blanche* for the expenses accrued in construction. Further complicating construction was the “battle of the gauges [track width].” The railways were originally built with an expensive wide gauge, but later tracks used the more common and less expensive meter gauge. Because the military insisted on keeping the wider gauge, standardization was impossible (Thorner 2001, 88–89). Added to the confusion was the narrow gauge needed for the twisting routes to the hill stations. Energy was a problem as well. The trains ran on coal, and the available Indian coal was so poor that the railway companies actually found coal importation more economical (www.indiansteamrailwaysociety.in). Ironically, the expansion of the railways led to an increase in mining, which lowered coal prices so much that importation was no longer necessary.



The “Poona Mail” in the early twentieth century. (University of Minnesota Libraries, Ames Library of South Asia)

Nevertheless, the profit motive superseded technical and ecological difficulties, and by 1910 India had the fourth largest railway system in the world. The railways provided the first opportunity in the 19th century to dramatically raise the profit for exports. John Hurd notes that, with the exception of goods that could be transported by river, only those items that were so valuable in the West that they could be sold at high markups were truly profitable (Hurd 1982, 737). Food crops, especially Bengali rice, could be sent by boat down the Ganges, and handloomed textiles were always valuable in Europe. During the U.S. Civil War, raw Indian cotton joined finished Indian cloth in high value. Aside from these types of goods, only the coming of the railway opened up new exports for large profits.

The actual construction of the lines provides a window from which to view the impact of the engineers’ education at places like Coopers Hill. Junior engineers arrived with no local knowledge, and with expertise in an environment defined by a temperate climate, marked by a series of low hills, gentle rivers, and green valleys. They brought with them the newest technological devices for railway construction, built in Europe, most of which were useless in a tropical climate. These engineers had to deal with monsoon floods, jungles, wild animals, thick vegetation, summer heat, the Himalaya, and raging rivers. And yet in 1853, Lord Dalhousie assured Parliament that any “doubts and difficulties” would be easily vanquished (Arnold 2000, 111).

The first monsoon seasons proved how flawed this Eurocentric confidence was. As trickles became torrents, it became obvious that exceptionally long spans would be needed for bridge building. The engineers also realized that the silty

diara along the banks of the major rivers acted like quicksand (see Case Study B). As a result, the British engineers were forced to turn to their Indian counterparts, with their knowledge of traditional engineering, for solutions. As David Arnold observed, “the pikes and caissons used in European bridge-building proved inadequate for the task and engineers learned from experience the value of the Indian technique . . . of sinking weighted brick or masonry piers until they reached a stable depth” (Arnold 2000, 112).

The impact of the railway on society and the environment was so vast that over the past century hundreds of volumes have been written dealing wholly or in part with this interaction. Limitations on length dictate that we must confine ourselves to but a few overarching conclusions; keep in mind, however, that the railways were primarily constructed to raise profits for the shareholders, who were British. As Daniel Thorner aptly notes, “the building of India’s economy for its own sake was simply not their concern” (Thorner 2001, 94). This meant that commerce was the focus of the new, rapid means of transportation. Indeed, one of the early incentives for private investment in the railways was the opportunity to extract coal from mines in West and North India. Before the railways were built, coal mined in West India had to be taken by bullock cart to the Narmada River; in South Bihar the process was similar, although the coal was transported on rough roads to the Ganges. The resultant costs were not practical: By the time western coal reached Bombay it was more expensive than coal imported from Wales (Arnold 2000, 108). The railway eliminated the expense and in the process demonstrated the various modes of profit making that the steam engines could provide. In turn, commodification, in the form of looking at all nature as having value only in its profit-making potential, became official economic policy.

Commodification led to dramatic changes for the peasant population. As rice was now being exported cheaply and easily, the margin of scarcity for the peasants became narrower, making them more susceptible to famine, as well as, arguably, marking the final dissolution of the moral economy. Jungles were destroyed to make way for more cash crops. Only the realization that forests must be managed or there would not be any timber left in India saved some of the wild lands. Meanwhile tobacco, jute, and especially cotton saw huge increases in growth.

The impact of the expansion of nonfood crops was felt primarily in two ways. The first, of course, was that in times of distress, peasants could not survive by eating their crops. In the early colonial period, rents were primarily paid in kind, so that the farmers paid their revenue as a percentage of their crops. In such cases they had some food crops remaining. Although this did not stop incidents of famine, it provided subsistence for a time. Unless the peasants were given small

plots for gardens, this meager sustenance disappeared when the raiyats switched to cash crops.

The second consequence of this form of commodification was the peasants' involuntary participation in the emerging world economy. Peasants were paid for cash crops with money rather than food, and the value of such crops fluctuated according to global supply and demand. Cotton was a prime example of this phenomenon. During the U.S. Civil War, the Northern states blockaded the Southern ports, forcing merchants to leave their bales of cotton in their warehouses. The subsequent value of cotton skyrocketed because of its scarcity. Speculators encouraged landlords to switch from food crops to cotton. During the war this was a highly profitable venture; however, the glut of cotton available at the end of the war made Indian cotton virtually worthless (and not just Indian cotton; after changing its entire economy from one based on agriculture to one based on cotton, Egypt was eventually forced to sell its shares in the Suez Canal to repay debts to Britain). The decline in the value of cotton in India may also have been one of the catalysts for the terrible famines of the late 1860s and the 1870s.

The agrarian population of India was caught by surprise by the changes wrought with the coming of a modern cash economy. They had little inkling that the value of their crops could be reduced to nearly nil in a relatively short time, for no warning signs were available to them. When the rains failed, or flooding destroyed crops, the farmers knew in advance that the seasonal output would be low, and they had time to react to it. A drop in cotton prices on the New York Cotton Exchange, however, was not an event that was advertised in the mofussil.

Finally, the railways contributed to major shifts in population. As goods became more accessible, the port cities of South Asia grew at a staggering rate. Peasants flocked by the millions to the major ports of Calcutta, Madras, Bombay, and Karachi. Karachi alone quadrupled in size from 1872 to 1931. The trains provided a quick, convenient, and relatively inexpensive way to migrate. As a result, South Asian cities expanded at a rate unknown in earlier periods. The cities simply were not prepared to handle such an influx. The stereotype of Indian cities as poorly managed urban centers for the unemployed and homeless stemmed in part from the population changes brought about by the railway.

The trains provide a good example of the tangential consequences of new technology. Deforestation, overextraction of minerals, commodification, and overpopulation were all consequences, at least partially, of the introduction of the railway. So too was the attendant validation of empire by machine. As Governor General Lord Hardinge claimed in 1848, "steam here would be the

greatest instrument of civilisation for the people, and strength for the Government" (Arnold 2000, 109).

FORESTS

Chapter 6 showed how the growth of the railway system led to a massive increase in deforestation. We will now turn to the consequences of forest management in the last 90 years of British rule. Here again remember that the ultimate goal of the Forestry Service was to maximize the profit from the timber and other forest commodities (e.g., resins) as much as possible. This often meant abolishing traditional rights that local cultivators and gatherers had possessed since well before the British Empire came into existence. This section will first trace the development of forest policy and then look at the effect of those regulations on various types of agriculturalists who depended on the forests for all or part of their livelihood.

From 1865 to 1867, a famine ravished Orissa, leading to upwards of 1 million deaths. Enough administrators blamed the famine in part on deforestation to provide incentive for the passage of the first forest regulations, which were put into law with the Indian Forest Act of 1865. The act only affected those areas already under crown control, but notably it also placed control of all Indian waterways and canals in the hands of the government (Barton 2002, 65). Although the Imperial Forest Service was formed in 1867, it was the Indian Forests Act of 1878 that encompassed regulations for all India, and thus affected society and environment across the subcontinent.

The regulations of the 1878 act were instituted only after great debate, primarily over the issue of customary rights. Across India the peasantry and forest dwellers had different duties and rewards, depending on the tradition of the region. How were all these customs to be dealt with in an India-wide policy? Gadgil and Guha suggest that three distinct schools of thought developed. The first endorsed a policy of annexation, under which all noncultivated land would be considered state owned. The second group advocated a pragmatic policy under which the state would control those forests they deemed valuable for strategic or commercial and environmental purposes. The third group, which Gadgil and Guha suggest incorporated a populist philosophy, believed not only in continuing customary rights but also argued that under the government's administrative policy of strict noninterference, government intervention would be hypocritical.

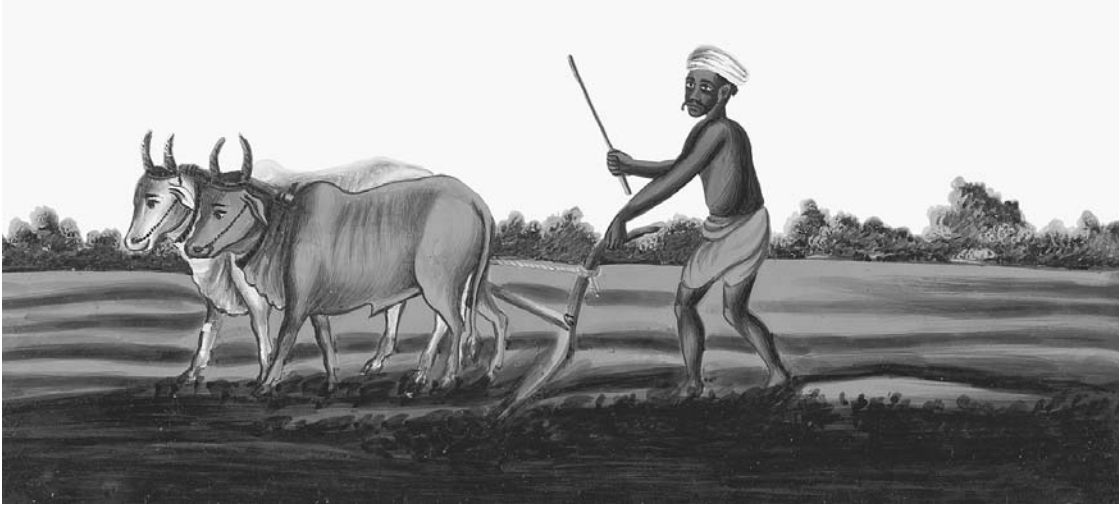
The outcome of the debate, as incorporated into the 1878 act, clearly shows the victory of those who favored complete state intervention. Forests were divided

into three classes. Reserved forests were those that the state owned, and its control of these forests was absolute; customary rights were abolished. In protected forests, state ownership was still the rule, but customary rights (insofar as they did not interfere with silviculture) were continued. The third category was that of village forests, in which all rights were retained by the villages that were situated in or were in proximity to the forest. As Gadgil and Guha point out, the vast majority of forest lands were reserved. By 1900, some 81,400 square miles of forests were labeled reserved, whereas protected forests covered only 3,300 square miles (Gadgil and Guha 1992, 124–134).

The forest regulations severely limited the ability of the agriculturalists to stay above the margin of scarcity. Customary rights, depending on the region, had included grazing, collecting firewood, gathering wood to craft farm equipment, and lopping off low-lying branches (Saldanha 1998, 712–717). These restrictions led to a shortage in fuel, while denying villagers protection from the elements and even harming cultivation practices. Forest officers' sense of empowerment and contempt for local knowledge, instilled through their education, compounded the problem. The common trend in Europe and America at the time was the total exclusion of fire from the forests; this stood to reason when forests became commodified, for administrators believed fewer fires meant larger amounts of timber. In precolonial India such control had never been practiced. After 1878, however, in East India fire policy only allowed burning to create fire lines. Forest guards were employed to sweep away any potential fire hazards. These guards, realizing that every fire that was extinguished raised the possibility of a catastrophic natural fire, would secretly start limited fires (Sivaramakrishnan 1999, 219–220). The Forest Service categorized such fires as arson, which led to increased surveillance, further limiting the peasantry in its attempt to survive Eurocentric legislation. As a result, those cultivators dependent on the forests responded in various ways ranging from petitions to confrontation.

I. M. Saldanha classifies peasant responses into three categories: appeals, evasion, and confrontation. Appeals took the form of petitions, explaining to the government that the practices were customary because previous forest controllers realized they were necessary for peasant survival. When these petitions were ignored (which they usually were), the peasants turned to evasion, which included ignoring the regulations and thus breaking the law. These evasions included the theft of wood as well as illegal cultivation. The third category, confrontation, included crowds demanding their rights from a forest officer (Saldanha 1998, 717–726). Beyond these three there were more militant forms of response, including arson and insurrection.

Agriculturalists who practiced swidden, or shifting, cultivation were particularly affected by the regulations. Although this method of farming differed a bit



Indian farmer plows his field with a pair of oxen. (Mary Evans Picture Library/The Image Works)

by region, in general swidden's practitioners survived by burning patches of forest, planting seed in the regenerated ground, and moving on after a period of time (ranging from one to several years), when the land lost its fertility. The British used the usual official reasons for eliminating swidden—it destroyed the forests, affected the climate, led to a loss in timber profit—but there were other, social reasons. Jacques Pouchepadass noted that such cultivators were often identified as lazy, but they were also seen as dangerous in that they were not under control (Pouchepadass 1995, 135). The British were uneasy about wandering peoples that permeated their empire and their country; we need only look at the attitude toward gypsies in England itself to see this prejudice. In India, the colonial government sent out thousands of civil servants to learn as much as they could about practices, social organizations, and customs. As more and more lands fell under the Permanent Settlement Act, survey and settlement officers were required to record the "Village Notes," a collection of answers to questions that dealt not only with land ownership but also with population, caste percentages, and any general comments they may have about the village (Hagen and Yang 1976). In addition, censuses were taken every 10 years. As trite as the observation may be, knowledge was power, and the government knew it. This is why wandering agriculturalists were seen as dangerous; indeed, many such groups fell under the purview of the Dangerous Tribes Act of 1871, which gave the government great power to limit their activities (Hill 2008). The commissioner of East Berar, in Central India, defined a dangerous tribe as "destined to commit crime, and whose descendants will be offenders against the law,

until the whole tribe is exterminated or accounted for in the manner of thugs" (Yang 1985, 108). And, indeed, extermination of nomadism seems to have been the policy. Swidden agriculture survived in a very limited form in some areas, but in many others the practitioners were forced into landless labor (Sivaramakrishnan 1999, 148–149; Gadgil and Guha 1992, 178).

Forest usage clearly had disparate effects on colonial India, ranging from the massive deforestation in the pre-1857 period to the drastic consequences on forest agriculture of the introduction of silviculture and forest control in the later colonial period. Public works had similar ramifications, although there certainly was more of a sense of goodwill involved. As the next section shows, however, public works changed the environmental history of South Asia as radically as did railroads and forestry.

PUBLIC WORKS

In 1893, Alfred Deakin, an Australian author with a strong background in Indian irrigation, made the following observation as to why local knowledge of irrigation should be ignored: "A moment's reflection will show how unreasonable it would be to cherish large expectations of enlightenment in the art of irrigation at the hands of the varied Hindu races . . . who . . . have never paid attention to the applied sciences . . . and have remained . . . dependent upon an agriculture which is but one remove from savagery" (Deakin 1893, 146). Deakin may well have been speaking for the majority of the engineers in India, who by that time were mostly Coopers Hill graduates. We have seen that esprit de corps and the concept of grit led to an attitude of insular Eurocentrism, but what were the ramifications of this attitude on the environment and people of post-1857 imperial India?

In 1858, when crown replaced company as the colonizing power, the Government of India also took control of the recently formed Public Works Department. This department set up a civil engineering hierarchy that paralleled that of the military, even assigning rankings to the administrative officers. Each individual canal project was known as a circle, and it had a chief engineer who was responsible to the lieutenant governor of the province. At the top of the hierarchy was the Secretary to the Public Works Department (later the Inspector-General of Irrigation), who reported to the viceroy. At the same time, a committee rearranged the civil engineering projects into two categories: State Works and Works of Internal Improvement. State Works were mostly buildings required for the administration of the country, such as law courts, schools, and barracks. These works were absolutely necessary for the government to function, and thus they

were not required to pay for themselves or make profits. Works of internal improvement, the committee argued, were primarily of benefit to the indigenous population, and thus the government expected these works not only to pay for themselves but also to bring in a healthy profit. The primary works in this category were irrigation systems.

The question that hovered over the committee's decision was that of responsibility for costs. If the government was not going to set aside the money for such projects, who would pay for them? The committee decided that the privatization of canal works would be the best solution. They already had a willing partner who was eager to raise the capital and more than anxious to start the projects: Sir Arthur Cotton. Cotton had begun his career as a military engineer in the 1830s, working on projects in South India. Having been educated before the founding of Coopers Hill, he was not averse to taking local knowledge seriously. His two great projects, along the Cauvery and Godavari rivers, were both based in part on medieval works and made Cotton famous. Peter Schmitthenner notes that the two systems were so successful, and they affected the agriculture and Tamil tradition to such an extent, that Cotton became a deity in the eyes of many Tamils, who compared him to the god Bhaghiratha, who started the flow of the Ganges River. Several Telegu authors have suggested that the economic strength and protection from famine brought about by the works helped reaffirm the region's claim to be the epicenter of Tamil culture (Schmitthenner, forthcoming). In 1988, the chief minister of Andhra Pradesh inaugurated the Sir Arthur Cotton Museum; some 3,000 statues of Cotton in the region testify to his continued popularity (<http://eastgodavariinc.in>). His European contemporaries, along with the generation that followed him, worshipped Cotton as the epitome of the Kiplingesque civil engineer.

Although Cotton was one of the few engineers who, early in his career, subordinated his Eurocentrism in favor of local knowledge, he later adhered to the Coopers Hill model of an engineer. Perhaps because of the difficulties he encountered with the indigenous irrigation systems on the Godavari, which unlike the Grand Anicut had been left to decay, by the 1850s he had become much more Western-oriented and universalist (Schmitthenner, forthcoming). Claiming that "a Delta is a Delta all over the world" (Hill 1995, 51), Cotton advocated connecting all the rivers of India by means of a series of canals. He argued that there was "not a single acre of land in Bengal, in all of India, or in the whole world, that would not be more productive if irrigated at one time and drained at another" (Government of India 1859). Cotton's other purpose in connecting the rivers was an attempt to replace the railways with a navigation system that would supply transportation and communication at a lower price than did the trains. Although this latter scheme would later ruin his reputation,

in 1858 he was the perfect person to organize the corporations and raise the investment needed to privatize the irrigation systems. In 1858 he formed the Madras Irrigation Company (MIC), which focused primarily on the Tunghabadra River system, and in 1861 he organized the East India Irrigation and Canal Company (EIICC) to build irrigation works along the Mahanadi River system in Orissa. The MIC signed a contract with the government under the "guarantee system." This contract stipulated that the Government of India would guarantee a five percent return on their investments. The administration would collect the water charges from the cultivators and turn them over to the MIC. Although the EIICC was not contracted under the guarantee system, the agreement was essentially the same as that with the Madras organization.

The experiment at privatization turned out to be a fiasco. All irrigation projects were turned over to the companies. In return, the government received half of all profits over five percent. The EIICC agreed to provide irrigation for approximately 1.5 million acres. By 1867, only 10,000 acres were under irrigation (Whitcombe 1982, 694, 702). In desperation, and with the approval of the government, the EIICC tried to raise profits by forcing unfair remuneration from the cultivators. The company first raised its water rate to Rs.3–5; rather than pay such an astronomical rate, the peasants simply refused to use irrigation water. The company lowered the rate to Rs.2–8 with no response. Only when it lowered the rate to Re.1 did the peasants begin buying the company's water; in fact, the number of peasants purchasing the water rose to 100,000, which actually cost the EIICC revenue. In response, the company found other ways to squeeze money from the peasants. When it rained, the company would open drainage canals so that rainwater would be mixed with irrigation water. Cultivators were forced to pay water rates even when irrigation water was not used. In some cases peasants were forced to sign multiyear contracts, even though neither party had any idea if irrigation water would be required for cultivation from one year to another. Finally, village councillors and landlords, none of whom personally used irrigated water, were charged an arbitrary rate for the "general improvement" that irrigation had brought to the region.

Even with all this chicanery, the EIICC still lost money throughout its tenure in Orissa. Peasants responded with resistance, most notably stealing water from the canals. Although the company responded by penalizing all cultivators in the region from which the water had been stolen, the company still faced bankruptcy by 1866 (D'Souza 2003, 41–46).

On the other hand, the MIC, which was limited to works in the mofussil regions of Madras, proved to be quite successful, making profits between 50 percent and 100 percent of the cost of the annual expenses for the system. The

reasons for this were geographical. The alluvial plains of the Tunghabadra were gently sloped, so the irrigation system required simple dams rather than the expensive works of the high country that the EIICC often faced. Because South India received less rain than the north, the requirement for irrigation water was much more immediate. Nonetheless, the costs of the EIICC brought down both organizations, and in 1868 they were bought out by the government (Mac-George 1894, 172). The cost of purchasing the MIC, which was not paid off until 1882, was £2.68 million; the EIICC payoff amounted to £2.2 million (Stone 1984, 22). So ended the government's experiment with privatization, along with Sir Arthur Cotton's reputation. As a final blow to Cotton's dream of an all-India canal system, the government switched its attention and financing to the railways.

In 1867, having bought out the private companies, the government determined that all public works enterprises would henceforth be the responsibility of the crown. The Public Works Department had already become compartmentalized a year earlier and was divided into military, railway, and civil branches (Stone 1984, 26). The civil branch then divided the irrigation works into major works, which were large canal systems that the department believed could make a profit. Other works were labeled minor, and were under the control of the provincial chief engineer (Whitcombe 1982, 699). Few of these works made a profit; in a sad irony it was only during times of famine that many projects, particularly those in North India, made money. In response to this phenomenon an Indian Irrigation Commission was appointed in 1900. The committee ruled that the government would, in the future, fund only sure moneymaking projects, or those projects the government was convinced would stave off famine.

The last great irrigation project under British supervision was the Sarda Canal in the United Provinces, which opened in 1928. As Elizabeth Whitcombe notes, it was the epitome of the utilitarian nature of irrigation projects in that it was expected to make a profit and stave off famine (Whitcombe 1995, 238). The Sarda Canal also epitomized the weaknesses of many of the projects. As many landlords argued when the project was in the planning stage in 1872, the Sarda Canal was not only unnecessary, but it would harm existing cultivation. They noted that there was no history of famine in Awadh, that irrigation needs were met by the existing wells, and that it would lead to disease because of waterlogging. The landlords concluded by claiming that not only would the canal system add to their financial burden, but it would not make money. The government, as expected, ignored local knowledge. And yet, in the end, the landlords' predictions all came true.



Sarda Canal in Uttar Pradesh. (University of Minnesota Libraries, Ames Library of South Asia)

Finally, it is important to look at the environmental impact of irrigation in the post-1857 period. The adulation for Sir Arthur Cotton in South India suggests that the record is not all negative. The projects in the Punjab provide good examples of the benefits and negative consequences of colonial irrigation projects. There is no doubt that the Bari Doab Canal, among others, helped to make the Punjab “the granary of India,” but at what cost? Among the charges made against irrigation was that it led to overcropping and to an unpredictable change from food crops to cash crops. Deforestation was increased to open more land for agriculture. Others have emphasized that the canals destroyed earthen wells and that they brought up salt deposits that hurt the land. The most common complaint, however, was that the canals instigated a rise in disease, especially malaria and cholera. In the end, the changes brought about on the ecological and social composition of India and Pakistan were so profound that they will still be in view long after the benefits disappear. Contemporary India is still dealing with controversy emanating from the continued construction of large dam systems.

HEALTH

Disease and its attempted eradication was second only to famine as a threat to imperial legitimacy, and it presented a conundrum for the colonial government. On the one hand, disease offered an opportunity not only to show the superiority of European science and technology but also a chance to spread colonial control into society in new ways. On the other hand, it took years to figure out the causes of many Indian diseases, during which the attitudes toward and discounting of local knowledge led to alienation and even insurgency throughout late 19th and early 20th centuries in India.

As Ira Klein has observed, blame for the spread of disease across India cannot be pigeonholed. Tradition played a role in that deep suspicion of Western methods made it difficult to inoculate the population against the most formidable diseases. On the other hand, modernization, in the form of transportation and urbanization, helped spread the contagions across India. The railways made it much easier for masses of people to attend fairs and religious festivals, which were notorious sites for spreading cholera. In the cities, where it was not uncommon for a dozen people to share a single room, mortality spread at a ghastly rate (Klein 1973, 652). Although it is neither possible nor necessary to pinpoint a specific cause of contagions, we can nonetheless get a sense of the anguish of the times by the effect of the major diseases and the imperial responses to them. First, however, the medical practice in colonial India must be described.

As noted in Chapter 6, the first medical professionals arrived as early as did the East India Company merchants. By 1763, they had been organized into the Bengal Medical Service in the Bengal Presidency and were soon followed by the establishment of similar services in Bombay and Madras. By the 1860s, the service had become centralized through the establishment of the Indian Medical Service (IMS). For our study, an important aspect of the medical service is that it was modeled on the Indian Civil Service, with the *esprit de corps* that such training entailed. Thus, there was continual resistance against “Indianizing” the IMS in any serious fashion. Although Native Medical Institutions were established in Calcutta and Bombay fairly early in the history of the Raj, the latter lasted only six years. As late as 1920 there were only 55 native assistant surgeons in the IMS (Arnold 2000, 57–61).

To understand the reluctance of Indians to join the colonial medicine school we must turn once again to Thomas Metcalf’s concept of “difference.” Western practices such as autopsy, inoculation, and dissection were anathema to upper-caste Hindus, who saw the acts as extraordinarily polluting. So demeaning were the tasks that in Calcutta, Doms, literally outcastes, filled the positions that were designed for Indian assistants. They served as midwives and funeral

assistants, in both cases fulfilling two of the most polluting tasks in Hinduism (Arnold 1993, 1–5). On the European side, such refusal was blamed on superstition and barbarity.

Finally, to bolster the colonial view of distance, British doctors in South Asia insisted that the contagious diseases found on the subcontinent had developed solely in India and had spread from there. They were equally insistent that India's "peculiar" environment caused the diseases. A brief look at the reactions to the major epidemics in colonial India illustrates the differences between the two perceptions of disease. An important scholar of the history of medicine in India during this period is David Arnold, and he sees smallpox, cholera, and the plague as the three major diseases during the 19th and 20th centuries.

In many ways smallpox was the most ghastly of the three, if only for its effect on physical appearance. A victim's face would quickly be covered with large pus-filled boils that emitted a horrendous stench. Those rare survivors were marked for life, usually blinded in at least one eye, and covered with pockmarks. The victims' lives were forever branded by the smallpox virus. Although a vaccine was developed as early as 1796, the disease was not officially eradicated until 1979. One of the major reasons for the delay in eradication was the difference in how the West and indigenous populations approached the disease. India provides a keen example of the opposing views.

Hindus, and to a lesser extent Muslims, addressed smallpox from a religious standpoint. Hindus associated the disease with the goddess Sitala, who was associated with cold entities (perhaps because the disease was considered "hot"). Supplicants offered Sitala cold dishes of food to placate her. The second indigenous response was variolation, or the introduction of the live smallpox virus into a healthy body, to build up immunities before the disease struck. This too was administered in a religious fashion, and Sitala was called on to protect the individual.

The colonial response to smallpox, on the other hand, was purely secular, relying strictly on inoculation; no prayers were offered, and water purification was not involved. In addition virtually no women were available to administer the vaccine to other women. As Arnold has observed, South Asians were deeply suspicious of the colonial method. Among other concerns, many saw Western medicine as another religion. Because one of the primary concerns of peasant religious systems was finding a way to ward off disease, it was natural that the European solution would be seen as an alternative religion. Indians also saw it as another form of intrusion into their privacy (Arnold 1993, 120–140). Although the IMS was eventually forced to compromise in terms of intrusiveness, Arnold argues that "medical monopoly, not cultural pluralism, was their goal" (Arnold 1993, 157).

Cholera was the most perplexing of the three diseases, to a large extent because European doctors in India refused to believe the cause of the disease was not environmental. While these doctors developed a stubbornness that bordered on a siege mentality, cholera mortalities skyrocketed to such an extent that the Indian Army was losing men at a rate that affected the defense of India. To cite one example, in November 1817, 764 of 11,500 men were felled by the disease. As Arnold notes, the cause for the deaths, as seen by the army and by local residents, was particularly telling. The military blamed the spread of cholera on the retinue of civilians who followed the army from battle to battle, while the residents saw it as retribution for the soldiers having slaughtered cattle in a sacred grove the night before (Arnold 1993, 169–171).

The government also saw the disease as exemplifying all the stereotypes the British had established to legitimize empire in South Asia. In particular, they looked at the various fairs and pilgrimages as sources for all that was uncivilized about India. There is no doubt that these large gatherings were breeding grounds for subcontinent-wide epidemics. As the doctors would learn later, the disease was transmitted through contaminated drinking water. Because all religious activities involved the use of water for purification, it stood to reason that such festivities would spread the disease. However, the British looked at the pilgrimage epidemics in a far different fashion. As we noted in Chapter 6, the British had a general antagonism to *melas* and pilgrimages, for they saw them as centers of potential insurgencies. Cholera simply confirmed to them the dangers of these gatherings. They saw these festivals as filthy and obscene. So convinced were they that India's unique environment and level of civilization provided the cause of cholera, that they claimed that all cholera in Great Britain must have emanated from pilgrimage sites in India, as Europe was too civilized to have produced the disease itself. Even after the cholera bacterium was identified in 1884 (embarrassingly, in a water tank in the capital city of Calcutta), many members of the IMS refused to acknowledge that the disease was a waterborne contagion. This attitude was illustrated by the remarks of the Sanitary Commissioner, who in 1884 still claimed that "theories of contagion may be acted on by private individuals if they like, but they cannot be made the basis of any action on the part of the state" (Arnold 1993, 192). By this time those who insisted on an environmental explanation for the disease were being held up to ridicule by physicians in the West (Arnold 1993, 183–199).

Unlike cholera, the plague was well known to European doctors. As a result, their response was vastly different. In 1896, the plague was officially identified in Bombay; within five months the viceroy had put forth "An Act to Provide for a Better Prevention of the Spread of Dangerous Epidemic Disease." So draconian were its measures that the act led to insurrection across India. The 1897

legislation gave the government unprecedented powers to control the spread of the plague. They had the right to stop and inspect any ship, all its passengers, and its cargo. They could prohibit fairs and pilgrimages if they suspected the crowds would cause an epidemic. Perhaps the harshest measure, however, was the right to destroy property (including homes), if medical officers thought they might breed the carriers of the disease (Arnold 1993, 204).

Why did the British respond to the plague with such stringent measures? Certainly European history had much to do with the response. The disease had changed the course of European society and culture in ways too detailed to cover here. Another fear was the spread of the disease to the European community. Unlike cholera, the medical establishment could not claim that the plague was a uniquely Indian disease. In the cities in particular, there were increasing demands for populations to be segregated and that the disease be immediately eradicated. Few Europeans actually caught the plague, but the fear nonetheless was widespread.

The Indian reaction was one of outrage, and it is easy to understand why. Violation of privacy, fear of pollution, and suspicion of British motives all played roles. Another important aspect of plague response was hospitalization. In this instance, as Arnold details, rumor was an important catalyst for a general suspicion of hospitals. These rumors ranged from tales of luring patients in to poison them, to hospitalizing persons so that the medical staff could loot their homes. Other rumors took a more political tack, relating to the disease itself. One suggestion was that the disease was a sign of the end of British rule; another that it was a sign of *kali yog*, or the age of chaos. Whatever the motivation, riots broke out in cities across India, including Calcutta and Bombay. When insurrection appeared at the doorstep of the capital of British India, the colonial government realized the necessity of compromise (Arnold 1993, 233–236).

Although disease may not have directly affected the geography of South Asia, it certainly changed the social environment. It also questioned unrelenting development. As medical knowledge improved throughout the 19th century, irrigation and transportation were acknowledged, however grudgingly, as transmitters. Although this understanding may have played a role in the suspension of building large irrigation systems, it was not long lasting.

FAMINE

As we noted in the last chapter, famine was a constant conundrum for the Raj. If, as Kipling claimed, the “White Man’s Burden” was to “fill full the mouth of famine,” then famine’s presence weakened the legitimacy of empire, for it laid

bare the vaunted claim of Pax Britannica. However, famine relief increasingly butted heads with economic policy. As such, the Government of India did its best to blame the victims for their own starvation, and the famine itself on the “perverse nature” of the South Asian population. In fact, economic policy increased mortality in every major famine of the 19th and 20th centuries.

As David Arnold has noted, theories abound as to the causes of famine in general. Perhaps the most obvious theories are based on climate. The monsoon (which could cause either flooding or drought), natural disasters such as cyclones or earthquakes, and the frequency of their occurrences, all became answers to the question of famine causation (Arnold 1988, 29–34). Mike Davis suggests that El Niño was the cause for famines in India and elsewhere in the late 19th century (Davis 2002, 117–211).

From Malthus in the early 19th century to Paul Ehrlich in the late 20th century, overpopulation has been a popular theory as well (Ehrlich 1968). The population theory, however, went beyond the simple realization that a lack of sufficient amounts of food led to famine. Overpopulation also led to overgrazing, and the inability to leave agricultural land fallow. Malthusian economics certainly opened a window to famine causation, but it was also guided (as Arnold has perceptively noted) by a bias against the “common” folk; even Paul Ehrlich showed his hand by focusing on the negative aspects of the “mobs” in “hellish” Delhi (Arnold 1988, 40). For the purposes of this discussion, however, Malthus’s prejudices led him and his followers to argue that famine, in fact, had positive aspects in that it eliminated many of the “riffraff.” Thus, Sir Richard Temple, the viceroy’s famine delegate in 1877, could claim that few would grieve for the victims, “for the fate they brought upon themselves, and which terminated lives of idleness and too often crime” (Davis 2002, 41).

Finally, there is Amartya Sen’s theory: “Starvation is the characteristic of some people not *having* enough food to eat. It is not the characteristic of there *being* not enough food to eat” (Sen 1981, 1; emphasis in the original). In the last half of empire, this was considered the primary cause of famine, and its foundation was built on the teachings of Adam Smith. Sen’s argument may be illustrated briefly by two of the most fatal famines of the second half of the 19th century.

The famine of 1865–1867, known commonly as the Orissa famine (although it spread through Bengal and Bihar, as well as the Deccan), began with the failure of crops in 1863. In Orissa this was accompanied by a dry monsoon season in 1865 and was exacerbated by the fact that the revenue demand was high and the land was owned primarily by absentee zamindars, who had little interest in the fate of their cultivators. Poor communication made it difficult to assess the

impact of the famine, and the privately owned irrigation company refused to continue its mission until a new land settlement had been put in place (Srivastava 1968, 56–58).

Perhaps the primary cause of starvation, however, was the rise in prices because of the government's insistence on letting the "invisible hand" of the marketplace set the prices. By 1865, the Government of India had established a set of policies based on a fundamentalist reading of *laissez-faire* economics. District officers were forbidden to import food grains from other parts of India for fear it would artificially affect prices. The Calcutta administration insisted that the district officers must be exaggerating the consequences of the scarcity, arguing that they were too emotionally tied to their district to give an objective opinion.

By early 1866, the government reluctantly began small public works projects to employ the most destitute; in a clever catch-22, only those near death were given work, which either exhausted them to the point that they were unable to carry out the work, or it killed them. In a similar fashion, poorhouses were set between 5 and 10 miles from the centers of the famine, in order to make the destitute prove that they were starving, and not merely lazy. Again, the weaker the people were, the more difficult it was for them to walk to the poorhouses. If they made it to the poorhouses, they received rations of food that were neither nutritious nor large enough to equal the minimum amount prisoners received. At times the poorhouses closed without notice because of lack of food or epidemics. Those who worked were paid in cash rather than food; since there was no food to purchase, the cash did them little good. In an astonishing act of obeisance to *laissez-faire*, the government even forbade charities to distribute free grain.

By 1866, peasants began to take their survival into their own hands. Grain robberies became common, especially from moneylenders and grain merchants. Only then did the government allow charities to begin distributing grain. As Hari Shankar Srivastava concludes, "Caste prejudices and notions of respectability, bowel diseases, lack of shelter and many other causes combined to increase mortality which was greatest among the lower classes. It is probable that one fourth to one third of the people of Orissa died in the famine" (Srivastava 1968, 81).

In spite of the massive mortality of the Orissa famine, little changed. Indeed, government policy during the famine of 1876–1879 was arguably more immersed in *laissez-faire* practices than the earlier one. The hardening of policy was due in a large part to two people: Lord Lytton, the viceroy from 1876 to 1880, and Richard Temple, his famine delegate. Temple was especially sensitive to charges

of interfering with the market. Three years earlier he had responded to famine by importing half a million tons of rice from Burma (Davis 2002, 36). He had also attempted to use British policy during the Irish famine as a model for the one in Bengal and Bihar, attempting to convince peasants to migrate to Burma or to wastelands that he thought could be settled (Hill 1991, 263–279). Some of Temple's actions did, in fact, temper the mortality rate of the earlier famine, but at a cost to his reputation; he was roundly criticized by both the government and the newspapers for spending revenue and interrupting the free market. Given a second chance, Temple was not going to make the same mistake. Instead, he became the ultimate defender of *laissez-faire* economics.

One of Temple's first moves was to introduce a new rations system, caustically called the "Temple wage" by those affected by it. At the poorhouses and public work sites he lowered the amount of food per person to one pound of rice per day. According to Davis, the nutritional value of the ration was lower than that of the Nazi concentration camp at Buchenwald (Davis 2002, 38–39). As roads became littered with corpses, most of whom had died of starvation, Temple responded by criticizing the love of the victims for "the bread of idleness," which could only be understood by "those who have seen or personally known these things" (Davis 2002, 41). According to John Beames, a district officer in Bihar during the 1873–1874 famine, Temple had personally seen "these things" in the following manner: "In his usual theatrical way, he rode at the rate of fifty or sixty miles a day through the districts, forming, as he said, an opinion on the condition of the people and the state of the crops" (Beames 1961, 232). As a result of such tours, hundreds of thousands starved.

The final famine in British India, a bookend to match the first famine in 1770, was again due primarily to human factors. After Burma fell to the Japanese in 1942, the rice crop of that country was no longer available to the Allied armies. They were thus more dependent on the Bengali crop. The fear of invasion once Burma fell was another cause. In those districts closest to the Burmese coastline, the rice crop was either pulled or destroyed. Finally, to slow the expected Japanese attack, all country boats of medium to large size were either removed or scuttled. As Bengal depended on country boats for communication and trade during the rainy season, the markets were completely disrupted. According to Sen (1981, 76), from December 1941 to May 1943, the price of rice in Calcutta increased almost five times over. Even the viceroy, Lord Wavell, noted "the different attitude toward feeding a starving people in Europe" (Wavell 1973, 123). The 1943 famine took the lives of between 3 and 4 million people. As it began, the British Raj ended with a famine that killed millions.

CONCLUSION

The British Empire affected the relationship between environment and society in ways it never intended. This was in a large part due to the Eurocentrism that accompanied civil servants when they arrived in India. The arrogance entailed in the firm knowledge that Western science and technology could solve any problem in any region of the world led the empire to ignore local knowledge. The unchanging optimism that free trade and supply and demand would right any wrong led to the deaths of millions. Finally, the view of South Asians as uncivilized barbarians promoted disease and scarcity.

In a sad irony much of this attitude toward nature carried over to independent India. Although the new government firmly rejected the policy of colonialism—Nehru becoming a founding member of the Non-Aligned Movement—that same government accepted the commodification of nature with open arms. Before exploring that policy we need to look at the effect of imperial control on the environmental history of Sri Lanka, and peripherally on Nepal.

SRI LANKA AND NEPAL IN THE MODERN ERA

This chapter turns briefly to opposite ends of South Asia: Sri Lanka and Nepal. On the surface they are dissimilar nations: Nepal is primarily recognized for its mountains and Sri Lanka for its island status. Their geographies have little in common; Sri Lanka's climate is mild; altitudes range from sea level to about 8,000 feet; Nepal's lowest point, on the other hand, is more than 2,300 feet above sea level. Its highest point is, of course Mount Everest (or Sagarmatha, its Nepali name), at over 29,000 feet. Historically they are very different as well; Nepal, which was unified in the 18th century, has no history of official imperialism, while Sri Lanka was officially the first crown colony in the British Empire.

Although the two countries may have little in common geographically and historically, there are similarities in the transitions of their environments based on cultural interactions and societal changes. Both countries faced serious deforestation, which had a detrimental effect on agrarian production. Both faced changes in traditional modes of subsistence that resulted in distinctive cultural and economic adaptations to their respective ecological settings. And, especially, both countries were seriously affected by transformations in their economies, dictated, at least in part, by European attitudes toward the utility of nature. In the case of Sri Lanka, colonial imperialism provided the catalyst. A century later, Eurocentric definitions of development played a similar role in Nepal.

SRI LANKA

In Chapter 3 we briefly focused on Sri Lanka in terms of precipitation and irrigation. During the colonial era, the administration measured the environment of the island more in terms of altitude than aridity, for it was the highlands in and around the former kingdom of Kandy in central Sri Lanka that defined not only the ecological changes but also the economic, social, and political evolution of the nation. The plantation economy that developed during the British Empire in

Ceylon (as the island was named until 1972), particularly in terms of coffee, will be the focal point in this section, for, as K. M. De Silva notes, "almost every salient feature of modern Sri Lanka may be traced back to the coffee area" (De Silva 1981, 282).

To understand the effect of the emergent colonial plantation economy of the 19th and 20th centuries, we must first look briefly at the history of the kingdom of Kandy. As we noted earlier, by the end of the 13th century any sense of a unified Sinhalese dynasty had disappeared; the Tamils took control of the northern portion of the island, and the Sinhalese migrated south. The breakup of the kingdom was in part due to environmental factors; the collapse of the great irrigation system led to a massive increase in the cases of malaria, which hastened the move south. The 16th century found Sri Lanka roughly divided into three kingdoms: the Tamil kingdom of Jaffna in the north, the Kotte kingdom with its capital in Colombo, and the kingdom of Kandy in the central highlands. Although the Portuguese, and subsequently the Dutch, were able to defeat and conquer Jaffna and Kotte, they were unable to capture Kandy. The mountainous terrain, with its raging rivers and predatory animals, proved extraordinarily hard to master. At the time the East India Company took Sri Lanka from the Dutch in 1796 and incorporated it into the empire, Kandy was still independent. Only with the death of the Kandyan king in 1798, which led to internal fighting, did the British first attempt to conquer the highlands. Their 1803 campaign ended in defeat, as much by disease and the elements as by the opposition forces. In 1815, the East India Company and local forces overthrew the king, but this was followed in two years by the Great Rebellion, which the East India Company eventually suppressed in a vicious fashion; some 10,000 Kandyans were killed in the uprising (Peebles 2006, 50).

The general ecology of the Kandyan highlands made the area both desirable and difficult to conquer. Located roughly between 1,500 and 5,000 feet above sea level, with Mount Pidurutalagala at 8,281 feet providing the apex for both the region and island, the highlands were composed of vast grasslands called patanas, which covered more than 75 percent of the area, with rain forests providing the rest of the vegetation. The entire kingdom of Kandy was surrounded by a dense forest belt, which acted as a wall against any invaders; only in the nineteenth century did the British carve out permanent corridors through the dense belt of green rain forest that surrounded the kingdom" (Webb 2002, 20, 2).

Two key social institutions were critical to the rising conflict between colonial ambitions for cash-crop plantations and the existing agrarian society. One was caste, which, although imported from South India, developed a distinctly Sri Lankan form. Instead of a small priestly caste being the dominant group in the social hierarchy, the elite group was the goyigama, whose members were rice

cultivators. Indeed, no priestly or warrior caste existed at all; instead, the Buddhist influence was reflected in the development of a celibate monastic group, which was obviously not hereditary. The second institution was that of *raja-kariya*, which was a caste obligation, in the form of a labor tax or corvée, owed to the king. This practice was transferred from the king to the Portuguese, the Dutch, and then to the British; *raja-kariya* was only abolished in 1832, in part to advance the free-trade notion of labor mobility (Webb 2002, 27–28; Peebles 2006, 51–52).

The introduction of plantations into Sri Lanka was not a British innovation. The Dutch had attempted to adopt the plantation system for cinnamon in the 18th century, but their control of the island was superseded by the East India Company before they had a real chance to prosper (Forrest 1967, 26–28). Unlike India, however, where the Company ruled, at least nominally, until 1858, Ceylon became a crown colony in 1802 (the first such colony within the empire). The crown had specific attitudes toward the governance and agriculture of Sri Lanka. In many ways, the evolution of colonial control of the island mirrored, or was mirrored by, Company administration on the subcontinent. This was especially the case in terms of the government's emphasis on a *laissez-faire* economy, as the Colebrooke-Cameron reforms made clear.

Foremost among the intentions of the colonial office (under whose auspices Ceylon fell) was to make the island an immediately profitable enterprise. This involved switching the economy from subsistence crops to commercial crops at a much faster pace than elsewhere in South Asia. To this end a commission was sent to Sri Lanka in 1829 to suggest reforms to the economy and administration. Many of these were incorporated into the Colebrooke-Cameron reforms in 1833. Administratively, the island was divided into five units, and English became the language of government. As in India, English schools and universities became the focus of colonial funding. The reforms also opened Ceylon Civil Service to the indigenous population (Blood 1990, 29–30).

For our purposes, however, the key changes were those to the economy. Government monopolies over trade and cinnamon cultivation (which was a holdover from Dutch rule) were abolished. *Rajakariya* was officially ended, primarily to advance the cause of movement of labor; as we shall see, a labor tax was still enforced. As on the subcontinent, the British saw agrarian practices in Sri Lanka as backward because of the lack of privatization. In particular, the practice of *chena*, or slash-and-burn agriculture, struck them as primitive. In nonirrigated dry zones, *chena* was a common practice. Cotton, maize, and certain types of rice were sown in the ashes of burnt forests (Webb 2002, 38–41). Although Sri Lankan *chena* was based on field rotation (with land laying fallow for an average of a decade or more), rather than cultivator migration, the colonial



Workers weigh tea at a plantation in Ceylon, ca. 1900. (Library of Congress)

government still had a basic aversion to chena for the same reasons we have seen in India. As a result, there was a steady increase in support for expanding the plantation economy.

By the 1830s, coffee had clearly established itself as the most valuable cash crop. The problem that emerged with the expansion of the plantations, however, was that of labor. The Kandyans had no real incentive to work on the plantations. As one of the early planters noted, “they have . . . their own paddy fields, their own cows, bullocks, their own fruit-gardens; and the tending and managing of these occupy all their attention” (De Silva 1981, 273–274). The Kandyans also realized how oppressive the conditions of labor actually were.

The planters and the government worked so closely together that conflicts of interest were inevitable. To increase their earnings, the planters required the administration to carry out the following advancements: guarantee a ready supply of immigrant labor; improve communications and trade through a network of

roads; and expand the availability of land for the plantations to grow and prosper (De Silva 1981, 283). All three of these demands affected the environment and culture of the Kandyan highlands, and, indeed, the political history of the entire island.

Producing coffee with a labor force from South India was a dicey proposition, for the success of the venture depended on environmental conditions in both the Tamil districts of India and in Sri Lanka itself. The conditions that augmented a large and steady labor supply were also those that brought the most misfortune to the Tamils. Drought or its opposite, excessive flooding, often led to famine. Although this situation provided the largest potential labor force, it also meant that the laborers were often famished and weak, making them particularly vulnerable to diseases. Most commonly they carried the smallpox virus and cholera bacterium, but they also marched through the mosquito-infested lowlands, picking up malaria before they reached the plantations. Indeed, in 1899, the government closed one major route from the coast to the highlands because it was such a health hazard (Bandarage 1983, 206). As roads were built and transportation became less difficult, the migrants often brought their buffalo, some of which were infected with rinderpest. Furthermore, as James Webb notes, the disease spread well beyond domesticated cattle. The disease could be spread through water, so popular watering holes for wild animals, such as deer and wild pigs, became breeding grounds for infection. Hoof-and-mouth disease was also a common import from India (Webb 2002, 93–99).

The business of labor recruitment contributed to the outbreaks of contagion, particularly on the plantations. The kangani system, as it was known, was ostensibly a response to the government's insistence on movable, free labor, but in fact was simply a different form of indentureship. The nucleus of the system was the kangani, or labor headman. He would be sent by the planters back to his village or district in South India with cash advances for potential recruits. The cash was given for transportation costs, but also to allow the recruits to pay the moneylenders to whom most were indebted. As a result, many were in debt to the planters before they even arrived in Sri Lanka, and consequently they had little freedom. Although contracts were signed only on a month-by-month basis (to provide for competition and to allow the planters to let the laborers go if the crop was damaged or failed completely because of variations in precipitation), workers who were in debt could not leave the plantation until they had paid off their advance.

This debt bondage allowed the planters to house and feed the workers in the cheapest manner possible. Laborers were housed in lines, which were rows of five-foot by ten-foot rooms, each holding five men; such an arrangement invited



Villagers and cart in rural Sri Lanka, ca. 1910. (Library of Congress)

disease to spread through the compound like wildfire. Diet exacerbated this phenomenon, for the nutritional value of the meal—generally rice, a few chilies, vegetables, and dried fish—was low (Peebles 2006, 71). The laborers were further weakened by the practice of withholding rice as a punishment for missing work. Between weakness, malnutrition, and disease, the mortality rate was extremely high. Gail Omvedt has estimated that between 1843 and 1867, some 350,000 of 1.5 million migrants may have died (Bandarage 1983, 205). This number, of course, does not include the many Sinhalese who died, nor does it measure the ecological and economic effect of the domesticated and wild animals that were felled.

Communication and transportation was the second consideration the planters demanded from the government. This included not only routes for the Tamil laborers but also a network of roads to transport the coffee crop from the highlands to the sea. A clue to the administration's success rate can be found in the development of the artificial port at the capital city of Colombo: By 1906, it was

the largest such harbor in Asia. The process, however, began almost a century earlier, as a response to the Great Rebellion, which ended in 1818.

The immediate purpose of a Colombo-Kandy road was to ensure that revolution would not reoccur, but by the time a metaled road was completed in 1820, colonial attention had turned to the economic implications of the new means of transportation. The planters (many of whom were also government officials) soon realized the savings that could be accrued by having carters transport the crop to the port by road, rather than having it carried across the steep, rough terrain. The system of roads continued to develop with the use of *rajakariya*, until the practice was abolished by the reforms of 1829. Plantation owners soon discovered that they were losing men and crops to attacks by the wild animals in the forests the roads traversed. Elephants, cheetahs, and leopards were particularly hazardous to business. As a result, demands were soon made for increased deforestation to protect travelers, the results of which we will see later.

The coffee industry flourished through the 1830s and into the 1840s, as the construction of the network of roads continued unabated, paid for by state revenue. In 1846, however, a global depression collapsed the price of coffee. A new governor, Lord Torrington, used the depression as an opportunity to introduce new taxes on the peasantry and abolish others to placate the planters. This exchange was done in part for reasons of *laissez-faire* and in part to lower the effect of the price crash on the planters, for Torrington was an inexperienced governor who depended far too much on the European planters for advice.

The 1848 Ordinances were revolutionary. They ended all import and export duties, which affected the planter, and replaced them with a series of taxes on the peasantry (De Silva 1981, 277). Among these were a land tax and a road tax, which particularly incensed the peasants of Kandy. A new form of *corvee*, the road tax looked suspiciously like a return of the hated practice of *rajakariya*. All men between the ages of 18 and 55 were required to provide labor to the state for six days per year. Buddhist monks were exempt, as were plantation workers, which seemed to confirm that the state was relieving the financial burden of the European planters at the expense of the Sinhalese cultivators.

The affected men could either perform the labor or pay an annual fee to hire workers (usually Indian laborers) to take their places. If they did neither, their land would be confiscated and sold for arrears; those who were landless were thrown into prison. The road tax remained regardless of environmental and economic conditions; in times of famine, drought, or flooding, men were still expected to perform the labor. So hated was the tax that many Sinhalese accepted work on the plantations rather than provide the *corvee* or pay the fee. Others participated in the Rebellion of 1848.

Finally, the planters' demand for more land was the cause of the greatest devastation, both social and ecological, to the highlands and highlanders. The owners had two goals. First, of course, was increased profit. The second, however, focused on competition from indigenous small planters. The highland peasantry had discovered that coffee could be grown on chena land as easily as on plantations. Although they were small landholders, the planters believed that the peasantry's combined crop diminished the planters' profits.

The critical transformation of the highlands began with the introduction of Ordinance 12 of 1848. Under this act, all forest lands were transferred to the crown; the only way the cultivator could prove ownership was to produce a land grant from the Kandyan kings, the last of whom had been dethroned in 1815. As such, virtually all the peasants became landless. If they were able to rent land from the government, they were specifically prohibited from chena farming. However, because many of the Ceylon Civil Service members who were in charge of selling crown land were also coffee speculators, the land was sold primarily to increase or develop new plantations. By 1880, almost 275,000 acres of highland forest land had been sold (Webb 2002, 70–71).

The combination of the ordinances of 1840 and 1848 crippled the cultivators' ability to be self-sufficient. As plantations spread, anger grew; the road tax was the last straw. The governor had effectively forced the peasantry to bear the brunt of income lost by the depression. In July 1848, peasant insurrection began in Kandy. A pretender to the Kandyan monarchy was put on the throne, and rumblings of a movement to drive the British out of Kandy began to circulate. When the rebels burned down a European's coffee store in Matale Bazar, the government responded with alacrity. Lord Torrington, whose ignorance of the highlands had led him to take his advice from the planters, responded with ruthlessness. Listening to the exaggerated claims of retired Lt. Gen. Herbert Maddock, the planter and adviser whose store had been burned down, Torrington declared martial law and sent the troops in. In the onslaught more than 200 Kandyans were killed, and only one British soldier was wounded. The capstone of the colonial response was the execution of a Buddhist monk for refusing to provide information on one of the rebels. In spite of almost unanimous pleas for compassion, the monk was shot through his saffron robes. Torrington and his advisers were recalled by the Colonial Office shortly thereafter (De Silva 1981, 316–320).

The ecological consequences of the ordinances were devastating as well. Massive deforestation affected the water supply. Without the leeching effect of the forests, rain thundered down the steep slopes, carrying the topsoil with it. Deforestation also made many of the mountain streams simply vanish. The few that were left often carried highly silted water, because of the plantation practice

of pulping the coffee before transporting it to lower the cost; the pulp was thrown in the streams and carried onto the paddy fields downslope. Increased soil erosion played a role in the loss of mountain springs. The institution of monocropping, along with the type of plowing used, sapped the nutrients from the soil. Planters were forced to turn to fertilizers to grow their coffee. Peasants lost the forests in which they grazed their cattle, forcing them to turn to the limited number of pastures available. With the intense competition for such land, the pastures were soon overgrazed (Webb 2002, 81–89). The loss of the forest barrier also made wild animals more vulnerable, leading to the introduction of trophy hunting. Elephants, leopards, deer, and boar were the primary trophy animals. Elephants were also hunted for valuable ivory; in the period between 1858 and 1862 alone, more than 1,500 elephants and carcasses were exported for their parts (Webb 2002, 99–103).

The clearing of the forests was tinged with irony, for within two decades of the end of the 1848 Rebellion, the coffee planters found themselves faced with a dilemma that would eventually ruin their coffee plantations. In 1869 there first appeared a fungus known as *Hemileia vastatrix*. The fungus spread slowly at first, but by the mid-1870s it led to the abandonment of estate after estate. These abandoned plantations became breeding grounds for the parasite. Without the forests to minimize the power of the winds, the fungi were easily airborne over far reaches of the highlands. By 1899, the highlands were producing fewer than 200,000 pounds of coffee, down from a high of 10,190,400 pounds in 1870 (Webb 2002, 108–113).

The coffee plantations never recovered. Planters attempted to replace coffee with other cash crops. Their first attempt was to grow cinchona, the bark of which produced quinine, an alkaloid used to prevent malaria. Although the cinchona industry was successful for a while, it soon proved not to be cost-effective. The planters then turned to tea, with which they had great success, so much so that agribusinesses such as Lipton acquired land in the highlands for tea production. Tea planting was a catalyst for a drastic demographic change, for, unlike coffee, tea was harvested throughout the year and as such required a permanent South Indian working class. By 1911, the number of South Indians in Sri Lanka was more than half a million, making up 12 percent of the population. The ramifications of this will be noted in the following sections. Finally, when a slump in the tea market in the early 20th century forced planters to look elsewhere, rubber was introduced. Rubber remained a viable commodity throughout World War I, but it was never able to recover from the Depression of the 1930s (Blood 1990, 33).

The coffee plantations, and the other experiments that followed in the highlands, provide an apt example of the tangential ramifications of human changes

in the land. The arrival of the Tamils from South India as a labor force helped to trigger a virtual civil war that continues to this day. Within two years of independence Sinhalese bitterness resulted in the Citizenship Act of 1949, which retroactively denied the rights of citizenship to Plantation Tamils (as they were called) and their descendants. In 1956, legislation was enacted to make Sinhalese the sole official language, leading to riots between the two groups in 1958. A new constitution in 1972 seemed to confirm the second-class citizenship of the Tamils and resulted in the formation of the Tamil United Liberation Front (TULF). Unlike earlier Tamil movements that had demanded equal treatment under the law, TULF led a separatist movement, demanding a Tamil state in the northern section of the island. Infighting led to the formation of splinter groups that, in 1977, formed the Tamil Tigers. In 1983, they launched a guerrilla movement that is still in effect despite numerous mediations.

The violence to the land was equally tragic. Gone were virtually all the rain forests, pastures, and mountain springs; the sharp reduction in wildlife was another result. As James Webb has summarized, “Tropical deforestation in large blocks to make way for coffee, and then chinchona, and then tea plantations changed the face of the middle and upper highlands, and some change was irreversible” (Webb 2002, 150). Both ecologically and socially, the colonial plantation system has left a sad legacy to Sri Lanka.

NEPAL

Nepal is defined by its mountains, rivers, and the narrow alluvial plains along its border with India, known as the Terai. This is not simply a geographic description, for its physical characteristics were crucial in the formation of the country’s economic and cultural hierarchy as well. The power structure in contemporary Nepal in many ways reflects the patterns of resource control that emerged in the 19th and 20th centuries. As such, it is important to look at the relationship between environment and society as it defines each of these geomorphic areas. First, however, a brief description of the place and its history are in order.

The country has three regions. The Mountain Region contains 8 of the world’s 10 tallest peaks; although the region is large, it is lightly inhabited, primarily by Tibeto-Nepalese groups such as the Sherpas. Nepal’s three major river systems emerge from this region: the Kosi, the Narayani (or Gandak, as it is called once it enters India), and the Karnali. The impact of these three river systems affects the political and economic state of the entire northeastern portion of the subcontinent. The Hill Region is located below the snow line and has its

nucleus in the Kathmandu Valley, which is the cultural and trading center of Nepal, as well as its political capital. The third region is the Terai, which is a narrow swath of alluvial land along the Nepal-India border. Although the Terai is the smallest of the three regions in terms of area, it forms the major agrarian belt of Nepal; consequently, it is the most populated and historically the most contested part of the country (N. Shrestha 1993, 56–60).

Various states have existed throughout Nepal for thousands of years, but the region did not become unified until Prithvi Narayan Shah, the Gorkha ruler, was crowned king of Kathmandu in 1768. Using land grants as incentives for the military to conquer neighboring states, he soon controlled the region. A war with the British East India Company from 1814 to 1816 resulted in much of the Terai being ceded to British India, and it instigated a contest for control within the court. By 1845, constant intrigue resulted in the forceful transfer of power from the king (who remained as a figurehead) to the prime minister, whose position became hereditary within the Rana oligarchy. Interested primarily in maintaining control, the Ranas were in constant fear that their legitimacy (which relied on the acquiescence of an inactive monarch) would be challenged. As a result, they spent the next century focusing on internal security; with the exception of British India, Nepal for the most part remained isolated from its neighbors (Heitzman 1993, 26–36).

Spurred on by the independence movements throughout South Asia, in 1947 the Nepali National Congress was formed in exile in India. Under the leadership of B. P. Koirala, one of three brothers who would serve as prime minister, and with tacit assistance from India, in 1950 the Nepali Congress Party (NPC) began an insurgency against the Ranas. The king seized this opportunity to seek asylum in the Indian embassy, and in 1951 an agreement was reached that restored the king to power as head of a parliamentary system. Crucially, the monarch controlled the military.

Unrest and dissatisfaction with the new government soon set in. Although revolutionary on the surface, the NPC pursued a policy of status quo. This meant following a practice in which a few wealthy patrons of the government controlled most of the land, which provided the bulk of the country's revenue. In 1960, with the support of the military, the king overthrew the government. Koirala (who spent the next eight years in prison) and the other major political figures were arrested, and the king became in effect a dictator for the next 30 years. In 1990, under internal and external political pressure, a new constitution was introduced, and elections took place the next year. Although the NPC won that initial election, the next decade saw a series of coalition governments, with political control lasting little more than a year on average for each coalition (Heitzman 1993, 38–48).

The beginning of the new century has been defined by two major events. The first was the murder of virtually the entire royal family by the crown prince in 2001. On June 1, Prince Dipendra, after an evening of apparent excessive drinking and cocaine use, killed his father and mother, as well as many other members of the royal family; he then turned a gun on himself. The dead king's brother, Gyanendra, was crowned king three days later, but the delay in succession, combined with the palace's muted response to the tragedy and reluctance to release information, led to speculation that a conspiracy, perhaps involving Gyanendra himself, was responsible for the murders. These rumors were used by an emerging Maoist guerrilla movement to expand their insurgency, and led to the restoration of parliament. The parliament quickly took advantage of its hard-won position by limiting the king's power and stripping him of control of the military (Whelpton 2005, 208–225). In November 2006, the government signed an agreement with the guerrillas that would include the Maoists in a provisional government; in April 2007, the former guerrillas joined the government, and the following December, parliament officially abolished the monarchy, with elections to be held in April 2008.

For our purposes, this political history evolves, in many ways, from Nepal's environmental history. From the time of Prithvi Narayan Shah, political control and land control have been woven together. Governments have fallen over massive protests against the hundreds of hydroelectric dam projects introduced over the past half century. Even tourism has had political and social ramifications. We now turn to each of the three regions to see this interaction in the northernmost of South Asia's countries.

THE TERAI

Nepal's plains make up the breadbasket of Nepal. Fed by the Kosi, the Narayani, and the Karnali, the Terai contains the most fertile and valuable agrarian land in the country. Much as in Kandy, the Terai once included a deeply forested belt that provided a barrier between Nepal and India. The lower reaches of the belt are really a continuation of the Indo-Gangetic Plain, and they have historically provided a safe haven for rebels and dacoits escaping from India. In more recent times the Terai has seen large numbers of Indian migrants searching for scarce arable land.

Beginning in the 18th century, the desire for cultivable land has been the primary cause for the rapid deforestation of the plains. Again, Prithvi Narayan

Shah is responsible for the genesis of the practice. To consolidate his power, the king institutionalized a series of land grants meant to tie the owners' fortunes to personal loyalty to the king. Although there were similarities to the mansabdari system in Mughal India, the grants in Nepal were more varied. Among the types of grants allotted, the four that were particularly important were the *birta*, *jagir*, *guthi*, and *kipat* land grants.

Birta grants were given to the nobility or prominent families as a form of patronage. These grants were heritable and tax free, and they could be transferred to another party. Beneath them were *jagir* grants, which should not be confused with land grants of the same name in Mughal India. Nepali *jagirs* were given to government employees in return for hard work and loyalty. In addition, invalided soldiers also received such grants. *Guthi* grants were given to charitable and religious institutions, while *kipat* land was assigned to specific ethnic communities. Finally, a fifth category, which differed greatly from the other four, was *raikar*. *Raikar* grants were actually rental agreements with cultivators. State land was given to peasants in return for a set revenue payment (Sinha 2002, 10; Hill 1997, 36–37).

These land grants began the process of deforestation in the Terai, for the government stipulated that each grantee was required to clear all cultivable land in order to produce as much revenue as possible. Through the first half of the 19th century, however, deforestation was relatively gradual, as timber was not a major export. According to Deb Sinha, elephants and their by-products were far more lucrative; in 1851 alone some 200 live elephants were sold to British India, yielding a profit of 50,000 rupees (Sinha 2002, 11). The second half of the century told a different story. As we saw in Chapter 7, between 1850 and 1900, some 25,000 miles of track were laid, all requiring wooden sleepers. The forests of the Terai, which were composed largely of hardwood species, contained hugely profitable timber. Indeed, a large sal today can command a sale price of \$1,000, suggesting that 19th-century deforestation in the plains was a highly lucrative venture (www.winrock.org). In addition, 19th-century Indian businesses, particularly paper mills and newspapers, required timber. With the Government of India claiming ownership over virtually all major forests in India, indigenous businessmen were forced to look elsewhere. The commodification of the forest in the 19th century began a long process resulting in a loss of more than 60 percent of the forest cover in the Terai (Sinha 2002, 31).

Two other government activities inadvertently may have quickened deforestation. Beginning in 1955, the government began a calculated program of resettling Nepalese, particularly those in the Hill Region, in the Terai. There were several reasons for this. The scourge of malaria, which had made many reluctant



Farmland in the Terai region of Nepal, close to the border with India. (Yann Arthus-Bertrand/Corbis)

to attempt cultivation in the plains, had been virtually eradicated. Deforestation had opened up fertile tracts that before had been too immersed in the “jungles” to be farmed. Migrants from Bihar, Bengal, and even Bangladesh, many of whom were landless, also took advantage of the clearing of the forests. Finally, P. S. Pravat suggests a more subtle, political reason as well. The residents of the Terai had had a history of conflicting with whichever power controlled the throne. They had played a crucial role in the downfall of the Ranas and were equally rebellious during the later period of the monarch’s dictatorship. Whether true or not, the government believed the hill people to be more loyal to Kathmandu than the Terai inhabitants. As such, they hoped to stifle the resistance by diluting the population (Pravat 2006, 14–15). Whatever the cause, resettlement provided a keen example of the vicious cycle of environmental degradation: the more forests were cleared, the more migrants settled on the land, leading to further deforestation.

Finally, the Private Forests Nationalization Act of 1957 had enormous consequences, both intended and unintended. For the Terai plains, the response to nationalization was paradoxical. Implemented to end the practice of clear-cutting by landlords, the act instead prolonged and exacerbated it. To save their lands

from nationalization, private owners would eradicate their forests. Such destruction allowed them to declare their property as cultivable, which saved them from the loss of vast areas of valuable, fertile land. The tragic irony of the act's implementation was not lost on local environmental groups and non-governmental organizations (NGOs), nor were the consequences of such massive deforestation. As Erik P. Eckholm has ruefully noted, "topsoil washing down into India and Bangladesh is now Nepal's most precious export, but one for which it receives no compensation" (Eckholm 1976, 78).

THE HILL REGION

It is one of the phenomena of many countries affected by imperialism that while the ideology of imperialism may be roundly rejected, many of the accoutrements of the imperialist system are not. Commodification of nature is a classic example. As we will see shortly, this is particularly the case for India, but the leaders in Kathmandu became enamored with grand developmental design as well, particularly when it came to harnessing its great rivers.

As noted earlier, Nepal is trifurcated by three great rivers, all of which eventually feed into the Ganges River in North India. The westernmost river, the Karnali, flows into the Gogra north of Kanpur, in Uttar Pradesh. The Gogra, in turn, joins the Ganges at Chopra in Bihar. The Narayani River becomes the Gandak once it crosses the Indian border, joining with the Ganges near Patna in Bihar. Finally, the Kosi River flows to the west, entering India in the Bihar district of Purnia, and joining the Ganges in western Bihar.

These rivers have several characteristics that are important to understanding the environmental history of Nepal, especially as they pertain to the country's political and ecological relations with India. The first is their physical location once they enter India; they spread across the Gangetic Plain and are perfectly positioned for irrigating vast portions of North India. The velocity of these rivers has also been important, for it has meant that historically the rivers have been of little use for navigation and communications. Finally, the amount of silt that the rivers carry from their sources in the young Himalayan mountains is crucial in terms of modernization and riparian control. As noted in Case Study B, the siltation of these rivers caused the colonial government a great deal of inconvenience in the 19th century. The government of Nepal would face similar problems with its attempts to dam these rivers and their tributaries in the 20th century.

The elimination of Rana control in Nepal, and subsequent offers of developmental aid from the United States, India, the Soviet Union, and Japan, coincided

with the apex of dam building in the West. The 1950s and 1960s saw the genesis of a great debate in the United States over the explosion of hydroelectric dams in the American West, resulting in the abandonment of the construction of megadams in the United States by the 1970s. In the Soviet Union the Krasnoyarsk Dam was completed in 1964; in the same year in Egypt the first stage of construction on the Aswan Dam was completed. Both of these hydroelectric projects would produce major changes to their respective riparian ecosystems, but they were representative of the contemporary ideology of development, which tended to focus on immediate benefits rather than long-term consequences.

The primary conflict between Nepal and India in this period, however, arose over a division of the output of the joint projects that were proposed in the 1950s. The first of these was the Kosi Area Development Plan of 1954. The plan would enable India to build a hydroelectric dam deep in the mountains that would be of primary benefit to India. Nepal's share of the water and electricity would be 33,000 irrigated acres, and a power plant that would generate only 9,000 kilowatts. Although the agreement was later modified to provide for a canal to be built in Nepal that would irrigate 180,000 acres, the impression that India was controlling the project was established. In reality, this was not far from the truth. Although the Nepali-Indian agreement in 1952 set up joint boards over which Nepal had formal control, India held the purse strings, and would only approve the release of funds on a quarterly basis if the Indian developers approved of the direction of the various projects (Whelpton 2005, 132).

Perceptions of inequality increased throughout the 1950s. Many in Nepal believed priority was given to those projects that benefited India the most. They pointed to projects such as the Trisuli Dam, which was of primary importance to Nepal and was completed nine years behind schedule. Such resentment was not alleviated by India's insistence that Nepal limit its share of hydroelectricity to that which it could use at the time the project was completed, rather than potential future needs. Given such fears, the Gandak Plan of 1959 proved to be the final joint project. The plan, which called for dams on the Gandak River, would have provided irrigation for 5 million acres in India and only 343,000 acres in Nepal. Anger over the Gandak Plan led to the cancellation of a joint project on the third shared river, the Karnali (Whelpton 2005, 132–133).

As India withdrew from various development projects, the World Bank stepped in. Projects funded by the World Bank became as controversial as the earlier ones funded by India. Again, a look at the circumstances surrounding the dams is necessary to understand the reaction to them. The World Bank

had a reputation for taking control of projects with little regard for the expertise and particular needs of the indigenous technocrats. World Bank funding came with a set of demands. In Nepal's case these included stipulations concerning narrowing the poverty gap, reducing the trade deficit, and balancing the budget (Whelpton 2005, 127). The World Bank also relied on Western engineers and contractors. As we have seen in India, the importation of Western engineers tended to produce an attitude dismissive of local knowledge. The subsequent lack of knowledge of regional geography was particularly apparent in dam building in the Himalayas, for the engineers severely underestimated the amount and effect of sedimentation in mountain reservoirs. Patrick McCully cites, for instance, the case of the Khulekhani Hydrodam, which, in a 30-hour storm in July 1993, lost almost 10 percent of its storage capacity because of siltation. Such events bring into question the dam's predicted utility span of 75 to 100 years (McCully 2001, 109).

Many of these issues emerged during the battle over the Arun III Hydroelectric Project. The Arun River is a tributary of the Kosi, located in the northeastern region of Nepal. In 1984, the World Bank reached an agreement with the government to fund a series of projects on the river that would be built by French and Italian companies, of which Arun III was to be the first (Escher 1995, 5). By the early 1990s, a concerted campaign by environmental groups, the small hydroelectric dam industry, and other NGOs swelled across the country. These groups argued that the project would displace 450,000 people and that a 75-mile road would disrupt the fragile ecology of the area. Importing some 10,000 workers, they argued, would jeopardize more than 100 endangered species in the area. In 1994, a coalition of anti-dam activists, the Arun Concerned Group, filed a complaint in the Nepal Supreme Court, claiming that the World Bank had violated its own policies (Udall 1995, 1). Amid accusations that the bank had attempted to hide its own inspection panel's conclusion that the Arun Concerned Group's claims were valid, Martin Karcher, the World Bank's division chief for Nepal, resigned. In his resignation letter to the bank's president, he argued that the bank's own reports showed that "investments in sectors such as education, health, training, transport and communication generate higher economic growth than corresponding investments in [hydroelectric] power" (McCully 2001, 273).

The protests against the Arun project had a ripple effect, for they were soon picked up by the political opposition to show the Congress government's lack of sympathy for the people. On April 6, 1992, the United Peoples Front, a Maoist party, organized a demonstration against a proposed project with India to dam the Mahakali River. The protest turned violent, and 12 or more people were

killed by the police (Whelpton 2005, 189). This event lit the fuse on a series of demonstrations that culminated with the fall of the Congress government two years later. The balancing act between development and social ecology of rural Nepal continues to affect the political structure of the nation.

THE MOUNTAIN REGION

Although more than a half dozen ethnic groups live in the world's highest mountain range, the best known are the Sherpas. Since Tenzing Norgay became, along with Sir Edmund Hillary, one of the first two people to reach the peak of Mount Everest, the word "sherpa" has become synonymous with "guide." The Sherpas reside in Khumbu, literally in the shadow of Mount Everest; their lowest settlement is 12,000 feet above sea level, which is near the timberline. As a result, they have had to balance their culture and livelihood with their environment more closely than most societies. In his major study of the Sherpas, Stanley F. Stevens claims that the Sherpas practiced five different types of subsistence, each one adapted to the season, altitude, and surrounding environment. In the lower-altitude zones the peasants primarily practiced settled farming and swidden agriculture. In middle-altitude zones agro-pastoralism was practiced, while at the highest levels a more limited form of agro-pastoralism took place, along with pastoral nomadism. Thus, from the lowest regions to the highest, agriculture evolved from traditional farming to limited grazing (Stevens 1993, 62–64). Stevens cautions against romanticizing the Sherpas' relationship with their surroundings, noting that their practice of pastoral and forest protection was selective at best. Nonetheless, the forests did have religious significance to the Sherpas, and some were protected for their aesthetic qualities as well as for economic reasons.

Given the pastoral and swidden aspects of their adoptive agriculture, the Sherpas were profoundly affected by the Forest Nationalization Act. Although there are disagreements concerning the immediate effect of the act in the mountains, there is no doubt that there were long-term consequences, because privatization abolished local systems of forest protection. As T. B. Shrestha has noted, the act "did not respect biophysical diversity of the nation nor [did] it provide any room to respect traditional right and responsibilities. . . . Adverse impacts soon surfaced in the form of environmental degradation on hills and mountains . . ." (T. Shrestha 2001, 1).

Over the past half century, however, the most profound effect on the mountain region has come from tourism. Since Hillary and Tenzing's expedition, more than 1,500 climbers have reached the peak of Mount Everest. The first tourist



Porters crossing suspension bridge during Everest trek in Sagarmatha National Park. (Christophe Boisvieux/Corbis)

visas were issued in 1955, and in 1964 the mountain region was opened to tourists who were not on expeditions to Mount Everest. In 1976, the tourist-friendly Sagarmatha National Park was opened, leading to the establishment of multiple hotels, restaurants, gift shops, and the like. As a result, the number of tourists visiting Nepal rose from 6,179 in 1962 to almost half a million at its peak in 1999 (Stevens 1993, 355; www.welcomenepal.com).

The impact of all these visitors has been varied. Although it has raised the income of the 65 percent of Sherpas who have become involved in the industry, it has had a detrimental effect on the mountain environment. The most visible change has been the accumulation of trash. In 1989, the late photographer Galen Rowell was repulsed by the garbage he found on the trail: "The solitary splendor is dazzling—until I glance down at my feet. There, frozen in the icecap . . . lies a miniature garbage dump; discarded candy wrappers, film cartons . . . half-empty food cans. . . . It is a familiar site to old Himalaya hands—the growing pollution of a priceless heritage" (Rowell 1989, 394). The problem was underlined when in 1984 an expedition collected 16 tons of trash solely from the base camps. Regulations have been enacted requiring trekkers to remove their garbage, but

they have been widely ignored, and the accumulation of refuse has grown accordingly with the growth in tourism (Stevens 1993, 399).

Two other environmental problems whose history can be directly attributed to the growth in tourism are increases in overgrazing and deforestation. The establishment of hotels and restaurants over the past few decades has led to a growth in livestock, particularly for supplying dairy goods for the teahouses and dining rooms. Many of the Sherpas have turned to the tourism industry as their primary means of subsistence, leaving fewer adults to oversee an increase in grazing in a smaller vegetative arena. As with many issues involving environmental change in the Himalayas, the extent of overgrazing is contentious. The impact of the resorts, however, cannot be denied.

Finally, as in so many parts of South Asia, the influence of development on deforestation is undeniable. From the early years of the tourist industry, timber was the primary source for fuel in the mountain resorts. Kerosene and gasoline were difficult to transport to the higher regions and were secondary sources of fuel for a long period. From 1989 through 1990 the process was exacerbated when India blocked imports of kerosene and gasoline as part of a political dispute between the two countries. Although firewood collection is now banned in Sagarmatha National Park, the cumulative effect of acquiring timber for fuel for several decades has been serious. As with overgrazing, the extent of tourism-based deforestation is debated by environmentalists, but the fact that it has been a catalyst for environmental change is not. As Stanley Stevens, who is skeptical of claims of major Himalayan deforestation, notes: "Even small-scale forest change may be highly significant for people who depend on forests for critical subsistence resources and have cultural concerns for the protection of sacred sources" (Stevens 1993, 407). Nor does its impact end with the Sherpas. From the loss of topsoil in the hills, to the increasing siltation in the rivers, deforestation in the Himalayan mountains has had a ripple effect across the nation.

CONCLUSION

India has had an integral connection to the economies of both Sri Lanka and Nepal. In some cases the relationship had a direct effect on the environment; the migration of large numbers of Tamils to the coffee plantations in Sri Lanka, for example, influenced ecological and political changes that make international headlines in our contemporary world. Others are more tangential, such as the de facto blockade of Indian imports of kerosene and gasoline to Nepal, which may have played a role in deforestation. Both cases exhibit the weaving of the various connections, be they environmental, economic, social, or political, into a whole

cloth called South Asia. The five nations that make up the pieces of that interlocking puzzle are still, for better or for worse, environmentally connected in such a manner that they will always have, if not a natural affinity, then an affinity of nature. Nowhere is this better demonstrated than in the environmental issues arising out of the partition of India into the independent countries of India and Pakistan (and, in 1971, Bangladesh), and the fight over the division of the subcontinent's natural resources.

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INDEPENDENCE AND PARTITION

As we noted in Chapter 7, the Indian independence movement is usually marked as commencing with the founding of the Indian National Congress in 1885. While it is certainly true that the Congress, under the aegis of Gandhi, took the primary lead in India's independence, its early years were marked by demands for home rule within the empire; it was only after the watershed events surrounding World War I that the movement changed to a more immediate demand for complete independence. And although the early nationalist movement is often defined as one of moderation, there were in fact radical periods, which were often framed around the issue of the impact of colonialism on the people and environment of India.

The original members of the Congress who met in December 1885, although from every province in India, were overwhelmingly Hindus who saw themselves as the loyal opposition. Their early issues tended to focus on forced Indian expenditures on British expansionism and misadventure. The cost of incorporating Burma into the empire was among the first concerns of the early Congress. The upkeep of the India Office at Whitehall in London provided a symbolic as well as monetary grievance, for the grand edifice and its staff were financed not by British taxpayers, but rather by Indian ones. The other major issue was one touched on earlier, namely the concept of "drain of wealth." This protest arose from the imperial plunder of raw materials, which were returned to India as finished products, thus denying any South Asian control of, or participation in, the use of its own natural resources.

The issue of drain of wealth became sadly obvious in the 10 years from 1895 to 1905, when India suffered an absolute decline in its total population because of famine and disease. A series of monsoon failures was exacerbated by a switch to cash crops by a large percentage of the peasant population, eliminating the possibility of an edible surplus. In 1896, the plague struck Bombay, furthering the spread of hunger and death across the subcontinent. The tragedy was multiplied by the limited imperial response; as Stanley Wolpert has noted, since more than 25 percent of India's revenue was being used to support the India Office, there was virtually no grain surplus to support the starving peasantry (Wolpert

2004, 263–264). Although the partition of Bengal was the main catalyst for a surge in nationalism in 1905, these environmentally related catastrophes must be taken into account as well.

In 1905, the Government of India, under the leadership of the most hated viceroy in its history, Lord Curzon, announced the partition of the province of Bengal into two separate provinces, East Bengal and Assam, and West Bengal, Bihar, and Orissa. Carried out with no consultation with Bengali leaders (or, indeed, any South Asians), the partition divided Bengali absentee landlords from their lands in East Bengal and made East Bengal and Assam the first Muslim-majority province in colonial Indian history. The government’s argument for partition was an administrative one, but there is no doubt that “divide and rule” ran a close second. By the end of the following year, the Muslim League had been formed in Dhaka, the new capital of East Bengal and Assam; under the leadership of Muhammad Ali Jinnah, the Muslim League would demand and receive an independent Muslim country of Pakistan.

The response to the partition of Bengal, however, based itself on the issue of drain of wealth rather than religious communalism. The swadeshi (“our home,” or home rule) movement focused on boycotting British goods. Spreading well beyond the borders of Bengal, huge bonfires of British clothes were offered to Agni, the Hindu god of fire. The boycott of shoes, imported cigarettes, cloth, and other British items led to a 25 percent decline in the importation of colonial goods (Wolpert 2004, 273). In 1911, the government rescinded the partition but punished Bengal by announcing that the capital of India would be moved from Calcutta to a new architectural symbol of empire, which was to be built outside the walls of the old city of Delhi. In one of the last ironies of empire, by the time New Delhi was completed in 1937, empire was clearly in its final years.

WORLD WAR I AND THE EMERGENCE OF GANDHI

In 1914, the viceroy declared war on Germany and Austria on behalf of India. In spite of the lack of consultation, India and its leaders began the war emphatically loyal to the empire. The events of the war, and particularly the treatment they received after the war, changed the demand of Indians from gradual home rule to immediate independence.

By 1915, tens of thousands of South Asians were fighting and dying not only in Europe but throughout the Ottoman Empire. This was a particularly contentious assignment for Muslims, as the khalifate resided in the person of the emperor. Battle deaths were compounded by those from disease and poor health care to such a scandalous extent that the secretary of state for India was forced

to resign when these health issues came to light. Back in India, hoarding and speculation led to outbreaks of famine, especially as priority for food crops was given to the war effort rather than to the welfare of the population. Nonetheless, and in spite of having the fewest number of British in the country since empire was proclaimed, India remained loyal. The country came out of the war as one of the victors, having helped save not India but England, and its people expected to be rewarded. Instead, the country received further repression, leading to a revolution in attitude and expectations.

In 1918, the Rowlatt Commission was established to review wartime restrictions on civil rights that had been enacted under the Defence of India Act of 1915, and make recommended changes. Instead of eliminating many of the provisions, as many assumed it would, the commission not only recommended further repressive actions but also suggested making the provisions permanent. Nothing could have united the disparate nationalist movement more quickly. Across the country protests erupted, some accompanied by violence. In response, provincial governors responded with greater repression.

The protest in Punjab was particularly deep, for since 1857 Punjabis had formed a disproportionate percentage of the British Indian Army, and they took the insult of the Rowlatt Acts personally. As a result of the Punjabi response the governor declared martial law, turning power over to Gen. Reginald Dyer, who, on April 13, 1919, outlawed meetings of three or more people. That same day, a group of some 10,000 people, apparently not having received the notice, gathered in a walled park known as Jallianwala Bagh, in the city of Amritsar. As they were celebrating a spring festival, Dyer appeared with his troops, and ordered them to fire point-blank on the crowd. By the time the troops had stopped shooting, around 400 civilians lay dead. When Dyer was reluctantly removed from his position, he was greeted in London as the "Savior of the Punjab."

The Amritsar Massacre, as it came to be known, would forever change the elements of Indian nationalism. No longer would most nationalist leaders look to the West as its model for governance. They would instead turn to Mohandas Karamchand Gandhi, whose inspiration was Indian civilization, not European.

GANDHI AND THE ENVIRONMENT

Gandhi was born on October 2, 1869, in Gujarat, which was home to a large Jain community. Gandhi's mother, although a devout Hindu, followed many of the practices of the Jains, two of which are particularly important to this study. First, she was a strong believer in the concept of ahimsa. As we described this term in

Chapter 2, ahimsa is the concept of total nonviolence to all living things. Second, she was a practitioner of self-punishment. As a young man Gandhi was rather wild; he ate meat once and even approached a brothel, although he turned back at the last moment. When he misbehaved, Gandhi did not receive the expected punishment from his parents; instead, his mother would blame herself for her son's acts and often would begin to fast. Gandhi found this sort of punishment far more difficult to tolerate than any that might have been doled out to him. These are the roots of Gandhi's philosophy of satyagraha, roughly translated as "truth-force."

After passing the bar in London, Gandhi, who initially was a poor speaker, briefly attempted courtroom practice, but in 1913 he accepted a position as the legal representative for a large Muslim trading firm in South Africa. This one-year position would last for 21 years, in the process transforming Gandhi from Mohandas to Mahatma ("great soul"). In South Africa, Gandhi saw the vicious effect of racism, in the form of anti-Indian sentiment. Gandhi began his "experiment with truth" in response to official pressure to induce South Asians to leave South Africa (Gandhi 1927). It was also during this period that Gandhi began to express his vehement opposition to industrialization and resource exploitation.

The Mahatma was essentially a cultural conservative; as such, he looked back to a "golden age" in Indian history, before the Europeans had entered South Asia. This view envisioned premodern India much as ethnographers of his later years did, calling Indian villages "little republics." As such, he hoped for a return to a rural India, with the *jajmani* system in place, where everybody helped each other so that the village as a whole received what it needed, as opposed to selfish individual desires. This is a quintessential Indian philosophy, harking back to the Buddha's Four Noble Truths, and as such it resonated with India's vast population that had not received a European education. For the first time on a national level, the independence movement was fought on Indian terms rather than British ones. This can be summed up in one of Gandhi's most famous (although perhaps apocryphal) statements: When asked by a reporter what he thought of Western civilization, the Mahatma replied, "I think it would be a good idea." More pointed was this statement in his newspaper *Young India*, in December 1928: "God forbid that India should ever take to industrialization after the manner of the West. The economic imperialism of a single tiny island (England) is today keeping the world in chains. If an entire nation of 300 million took to similar exploitation, it would strip the world bare like locusts" (Guha and Martinez-Alier 1998, 156).

According to Diane Jones, Gandhi's environmental views basically centered on four main concepts. The first, of course, was ahimsa. Gandhi took from both Jainism and Hinduism the belief that all life is part of the one great cosmos or



Mohandas Karamchand Gandhi in London in 1931. (The Illustrated London News Picture Library)

the essence of creation (Brahman), and thus all creatures deserve to be treated with respect. Asceticism was his second environmentally related goal. His belief in the simple life, where each person finds contentment in the fulfillment of his or her needs rather than desires, meant that the commodification of nature would no longer be an issue. In this same vein, Jones argues, he was a harsh critic of exploitation, both of humans and of nature as a whole. Finally, Gandhi's opposition to Western industrialization formed the fourth foundation of his environmental philosophy (Jones 2000, 167–172).

The Mahatma was particularly eloquent in critiquing the last issue. In his small book *Hind Swaraj (Indian Home Rule)*, published in 1909 while he was still in South Africa, Gandhi wrote at length about the perceived evils to India of Western modernization, particularly those found in industry: "Machinery has begun to desolate Europe. . . . Machinery is the chief symbol of modern civilization; it represents a great sin" (Gandhi 1909, 63). Indeed, with this warning Gandhi seems to have been quite prescient; five years later, with the onslaught of World War I and the reality of some of the horrors of modern industry, many in Europe would begin to question modernity in a Gandhian fashion.

Turning to the effect of industry on India, he argued that "the workers in the mills of Bombay have become slaves. The condition of women in the mills is shocking. When there were no mills, these women were not starving. . . . Impoverished India can become free, but it will be hard for any India made rich through immorality to regain its freedom" (Gandhi 1909, 63). Long before the negative impact of chemical fertilizers became widely known he warned that "trading in soil fertility for the sake of quick returns would prove to be a disastrous, short-sighted policy. It would result in virtual depletion of the soil." Gandhi was also an early enthusiast of recycling, decades before it became an environmental cause in the industrialized world (Lal 2000, 184). In short, Gandhi argued, humanity should return to self-sufficiency: "There is enough in the world for everybody's need, but not for some people's greed" (Guha and Martinez-Alier 1998, 157–158).

Naturally enough, Gandhi's convictions led some to dismiss him as naive or lost in a supernatural fog. Particularly vexing were Gandhi's claims that natural disasters and epidemics in India were God's way of punishing the subcontinent. Thus, when influenza killed some 12 million in India in 1918 and 1919, he claimed the epidemic to be evidence of God's intimation that Western civilization would be doomed to failure. Rabindranath Tagore, India's Nobel laureate for literature, and the man who gave Gandhi the title of Mahatma, vehemently disagreed with Gandhi's political philosophy over his interpretation of the Bihar earthquake of 1932. In January of that year an earthquake measuring 8.4 on the Richter scale killed more than 10 thousand people. Gandhi claimed



Indian pro-independence leader Mohandas Gandhi and 78 of his followers march 240 miles to Dandi in March 1930 to protest the doubling of the salt tax by the British. (Library of Congress)

that the disaster was God's revenge for the continued practice of untouchability in India. Tagore, who had grown deeply worried about Gandhi's wholesale renunciation of modernity, denounced the Mahatma's claim, and a gulf widened between the two old friends. Gandhi was not swayed by such criticism. Many of his followers seemed not to realize that their leader saw satyagraha not simply as a means to independence; rather, Gandhi saw the practice as a moral way of life to be followed by all. As a result of this conviction, satyagraha had three major components. The first was self-discipline; Gandhi argued that only with internal discipline could one take a beating without fighting back. This involved, fasting, chastity, and performing all the menial tasks at his ashram, regardless of caste, in order to instill humility. The second concept was sarvodya, roughly meaning "the welfare of all." Sarvodya was Gandhi's attempt to return to a simple, village lifestyle, where major industry was not necessary. India's independence was his third goal.

Nor was this a passive movement. As Suzanne Rudolph has noted, Gandhi introduced a "New Courage" (Rudolph 1963). Gandhi argued that only the weak dealt with disagreement by force; true courage was internalized. It was also a

dynamic form of resistance. Gandhi claimed “that if the choice is only cowardice or violence, I advocate violence” (Gandhi 1920). Satyagraha was also a perceptive political tactic, as is clear from his second great campaign, the civil disobedience movement, which lasted from 1930 to 1934 and whose central act of resistance was the Salt March.

In 1929, during one of the few liberal regimes in colonial history, the India Office in London turned over direct financial control of the subcontinent to the Government of India in Delhi by establishing the Tariff Board. One of the board’s early acts was to abolish the excise tariffs on cotton, which had become the symbol of colonial resource exploitation. To make up for the lost revenue, however, the government doubled the tax on salt (Wolpert 2004, 208). In retrospect, few other acts could have played into Gandhi’s campaign so well. Salt was the lifeblood of the peasants, many of whom worked 14 hours or more per day. As they toiled in the hot sun, their perspiration depleted their salt supply, and they had to refurnish it through salty foods. As such, the salt tax was a direct burden on the vast majority of the Indian population.

To demonstrate to the world the absurd cruelty of the salt tax, Gandhi decided to march from his ashram at Sabarmati to Dandi on the Arabian Sea, a distance of some 240 miles. Once he arrived, he proclaimed, he would break the law by making his own salt. On March 12, 1930, Gandhi set out with 78 followers on his march to the sea. Now 61 years old, and wearing only a dhoti and carrying a walking stick, he looked more feeble (in part because of his years of fasting) than he actually was.

As the Salt March progressed a pied-piper effect seemed to emerge. Through each village Gandhi passed, people would join his march. He urged those who stayed behind to pressure the government-appointed village officials to resign their posts. International pressure on the government appeared as well. Gandhi made certain that movie cameras were present, and in cinemas across the globe, on the Movietone news clips that were shown before each feature, people who had never before heard of the Mahatma began to follow the march, wondering what the government would do. On April 6, Gandhi reached the sea and grabbed some salt, thus breaking the law. The government’s response was to ignore the act; however, as people across the nation began selling salt illegally, the action had to be addressed. At first all the party leaders except Gandhi were arrested; when the sales continued, the Mahatma himself was finally arrested on May 4 and imprisoned for eight months.

Gandhi’s eventual compromise with the British authorities, in the form of the Gandhi-Irwin Pact, dismayed many of his followers; in return for legalizing the picketing of liquor stores and allowing salt to be processed by peasants living

on or near the sea, Gandhi agreed to drop his demand for an investigation into cases of police brutality during the satyagraha (of which there had been many) and to suspend the satyagraha. He also agreed to attend a roundtable conference in London to discuss India's future.

In retrospect those disappointed colleagues may have had reason for their dismay. Gandhi arrived at the conference to find that the deck had been stacked. The government had invited three representatives of the Muslim League (Muhammad Iqbal, the philosophical force behind the idea of Pakistan, Jinnah, and the Aga Khan, one of the richest men in the world). They had invited two leaders of the Sikhs, as well as B. R. Ambedkar, who claimed leadership of the dalits (untouchables). To Gandhi, this was a clear example of the colonial policy of "divide and rule"; indeed, the government made it clear that it would not grant independence without seeing to the desires of the various non-Congress groups. Gandhi walked out of the conference and was promptly arrested when he arrived back in India.

To many of the "Young Turks" in the independence movement, the failure of the Gandhi-Irwin plan was proof that the Mahatma's methods no longer had relevance for the independence movement. For Gandhi, however, the satyagraha had been a success. The Salt March had gained international attention for the cause, while producing relatively little bloodshed. A compromise solution had been attained; the fact that the British did not keep their promises did not prove lack of success. Perhaps unfortunately, as independence drew nearer, the "pragmatists" increasingly overshadowed Gandhi. Jawaharlal Nehru, pegged to be the first prime minister of independent India, was particularly concerned over Gandhi's continued insistence on Hindu-Muslim unity by the time of independence. Although he was Gandhi's most devoted follower and genuinely loved him, Nehru could not see a solution to the impact that divide-and-rule and communal agitation had so effectively produced. Many of the younger leaders also thought satyagraha had been a fine instrument for the independence movement but was too idealistic for the hard negotiations needed as independence clearly drew near. As Gandhi's private secretary Pyarelal noted, "the impossible old man was put on a pedestal, admired for his genius . . . listened to with respectful attention and bypassed" (Embree 1980, 131–132).

By 1946, the war had ended, Winston Churchill had been ousted in favor of a Labour government, and the writing was on the wall. The basic disagreements changed from those concerning Indian independence to questions of the timing and form of the transfer of sovereignty. In February the new prime minister, Clement Attlee, announced the formation of a cabinet mission to be sent to India to recommend a solution to the impasse between Hindus and Muslims over the

shape of an independent Indian subcontinent. In late April the Cabinet Mission Plan was proposed to all parties. The plan called for a limited federal government that would control only defense, foreign affairs, and communications. All other ministries would be handled by provincial groups: Group A included the areas in the northwest that the Muslim League was demanding for Pakistan, and Group C was composed of Assam and Bengal. Group B would include the rest of India. The plan would thus allow for an Islamic majority in Group A to decide on the type of government it wished to have internally, and a nearly equally divided Islamic and “general” population to make policy in Group C. It seemed like a suitable compromise. Gandhi and Congress president Maulana Azad enthusiastically accepted the plan on behalf of the Congress Party, and Jinnah somewhat less enthusiastically on behalf of the Muslim League. Nehru was set against the plan, however, and within weeks announced that in all likelihood there would be no grouping, and that a stronger federal government would be required. With that, Jinnah proclaimed an end to constitutional approaches and called instead for “direct action” to bring about Pakistan. The violence that followed persuaded all but Gandhi that partition was the only solution. With that decision, as the contemporary colonial administrator Penderel Moon noted, all parties with “quite unprecedented unanimity set straight down a path leading to mass slaughter” (Moon 1961, 70).

In terms of the political future of the subcontinent, Gandhi may have been superseded. However, his legacy lives on in Gandhian environmental actions across the globe. The founders of the deep ecology movement, which argues that all species must be understood and treated as equals, claim the Mahatma as an inspiration (Lal 2000, 186–187). So too do the leaders of the two best-known environmental actions in independent India: the Chipko movement, which we will review in Chapter 10, and the Narmada Bachao Andolan (Movement to Save the Narmada), which is the subject of Case Study C. In the final analysis, Suzanne Rudolph may have put it best: Gandhi’s primary contribution, she wrote, was “what he did for Indians, rather than what he did to Englishmen” (Rudolph 1963, 98). That legacy can still be found in contemporary India.

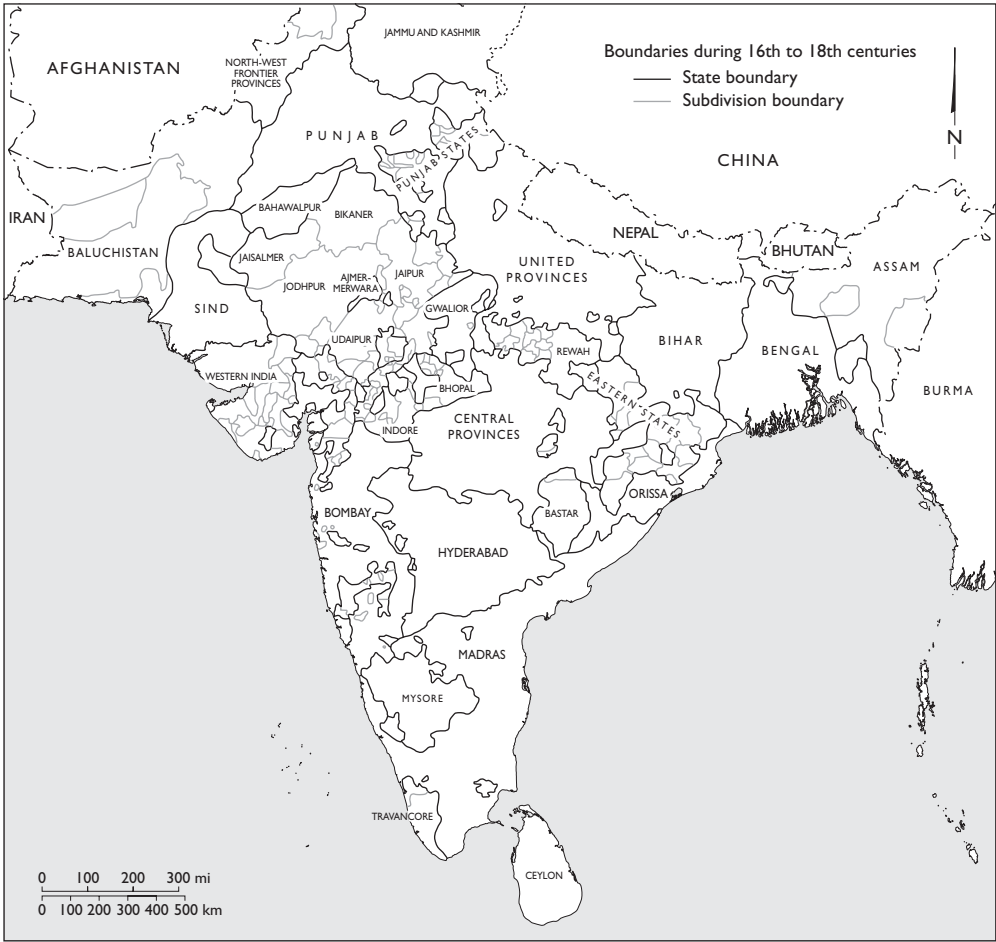
THE ENVIRONMENTAL CONSEQUENCES OF PARTITION

Once the partition of the subcontinent was agreed upon, the British had three major problems to address. The first was the division of imperial India’s assets. The final decision was based on population percentage; India received 82.5 percent of the assets, and Pakistan received 17.5 percent. Legal wrangling continued for decades over this “division of the spoils” (P. Scott 1974). The second

issue concerned the princely states, whose rulers had subsidiary alliances with the British. In return for turning over control of defense, foreign affairs, and communication, the princes kept sovereignty over their kingdoms. Aside from their ability to amass fortunes, the nizams and nawabs had virtually no political control, as each state was appointed a political agent by the crown, whose "advice" the rulers were forced to accept. Nonetheless, their legal sovereignty became an issue at the time of independence. The British ordered the princes to accede to one of the two successor states; by the time of independence, only two major states had refused to accede. One was Hyderabad, in the Deccan; the Indian armed forces incorporated it into India in 1950. The other was Kashmir, over which India and Pakistan fought two wars and nearly a third in 1999. Kashmir was also the primary catalyst for the nuclearization of both countries, along with the environmental dangers that such a process entails.

The most complex and ultimately tragic issue, however, was that of the actual partition of the subcontinent into India and East and West Pakistan. The government feared accusations of bias by Muslims, Sikhs, and Hindus. As such, the government decided the actual borders must be delineated by someone who was scrupulously neutral. This demand ruled out all experienced civil servants, for it was thought that those with intricate knowledge of the border areas were too open to criticism by one group or another. Instead, the government settled on a man who had never even visited South Asia, a former advocate named Cyril Radcliffe. Radcliffe arrived in India less than a month before independence. He also arrived during the hottest period of the year, and he hated the environment. As a consequence he rarely moved from his office, drawing boundaries on outdated maps; once he was finished, he left India immediately, because, as he said, "there will be roughly 80 million people with a grievance and who will begin looking for me. I do not want them to find me" (Tan and Kudaisya 2000, 94). He never returned to South Asia.

Radcliffe's borders were announced two days after independence. His boundary award, which was to decide the future of millions of people, was all of six paragraphs long. It not only followed no geographic dividing lines but the award put fields in one country and villages in the other; border communities (especially the Sikhs) arbitrarily became citizens of Pakistan or India. In some cases the fronts of houses were in India and the rear doors were in Pakistan. Furthermore, thousands upon thousands of peasants discovered two days after independence that they were not citizens of the country in which they had expected to be included. Some 10 million people, many of them abandoning land that had been in their families for generations and taking only the possessions they could carry, migrated from one country to the other. In the process, due to suspicion,



The Indian Empire, 1947.

anger, and fear, upwards of 1 million people died. Such was the legacy of Radcliffe's demarcations.

The environmental consequences of the award were dramatic as well. Because the boundaries were made with little regard to natural divisions, ecological features were affected as well as populations. The western Himalayas became the territorial property of Pakistan, India, and China, leading to a war between the latter two countries in 1962. Fields and wells became separated; mangroves in the east lost their continuity. The most grievous ecological consequence, however, involved the division of rivers, canals, and irrigation systems. The absence of a clear accession of each country to their shared waterways continues to affect the relations between India, West Pakistan (now simply Pakistan), and East Pakistan

(now Bangladesh), so the hydraulic ramifications of partition must be covered in some detail.

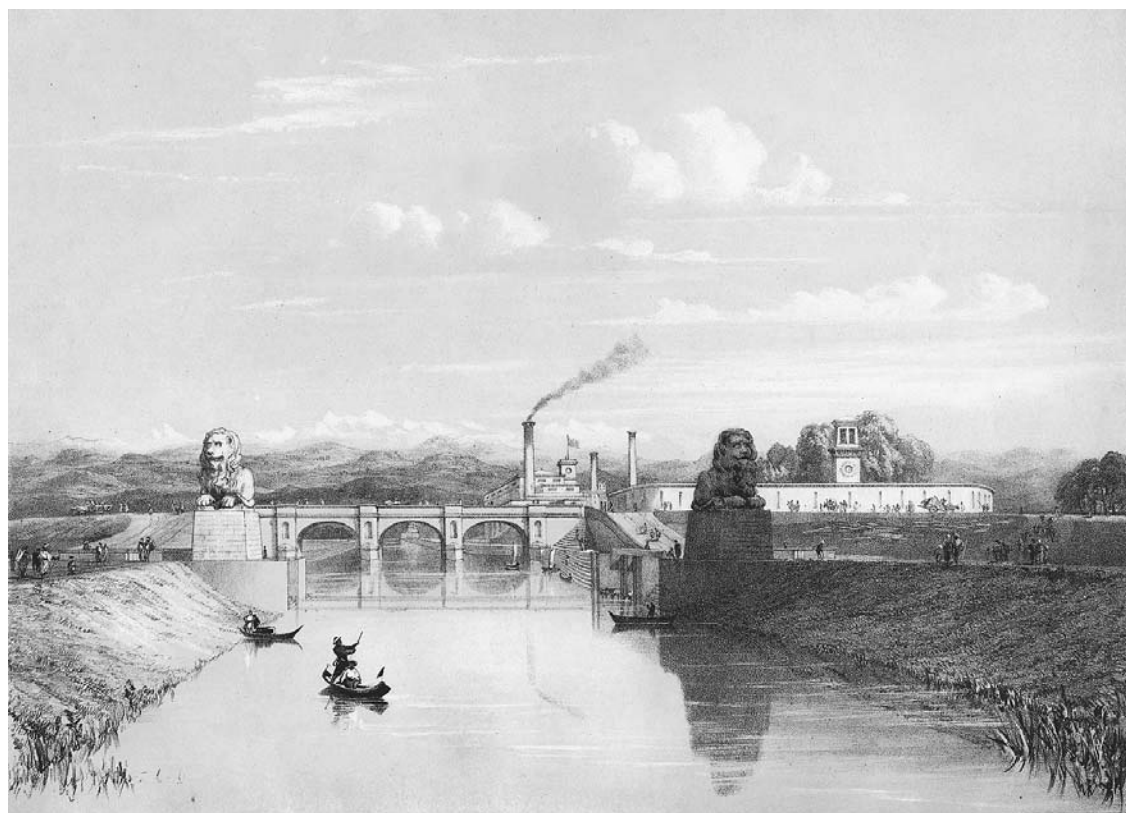
PARTITION AND THE INDUS RIVER SYSTEM

The Indus River system had seen the first major public works of colonial India, and the network of weirs, canals, and irrigation ditches that crisscrossed the Punjab had become the major symbol of the power of Western science and technology to bring civilization to the masses of South Asia. The headworks of the Ganges Canal, which featured two enormous stone lions, was as much a signal of imperial superiority as was the Gateway to India in Bombay. Perhaps the colonial exaltation of the irrigation system made it particularly difficult for the last colonial administration to put effort into a practical division of the five waters, or perhaps it was Nehru's belief that the two countries could work out the details after independence. In either case the first war over Kashmir, which began shortly after the transfer of power, quickly put an end to the possibility of compromise (Tan and Kudaisya 2000, 85).

As a result, the two countries received a bifurcated Punjab, one that was based primarily on political rather than ecological factors. Although the Indus, Jhelum, and Chenab rivers were primarily located in Pakistan, all three merged in southern Punjab to form the boundary with India. The two rivers that caused the greatest contention, however, were the Sutlej and Ravi. Both rivers passed through both countries and were sources for the complex irrigation system in which the British had taken such pride. The partition award in effect cut away the most important irrigation works in West Punjab in Pakistan from their water sources in East Punjab in India.

Pakistan in particular was hit hard by the division. Lahore district, which contained the capital of the formerly combined province (and its largest city), and Montgomery district to the southwest, were two of the East Punjab regions most dependent on irrigation. They suddenly found themselves reliant on headworks located in India. The Ravi River, which was a source of water for much of the Punjab irrigation system, was bifurcated between Lahore and Amritsar; this had the effect of separating those branches of the famed Upper Bari Doab Canal that fed large parts of West Punjab, from their source of water (Tan and Kudaisya 2000, 96–100).

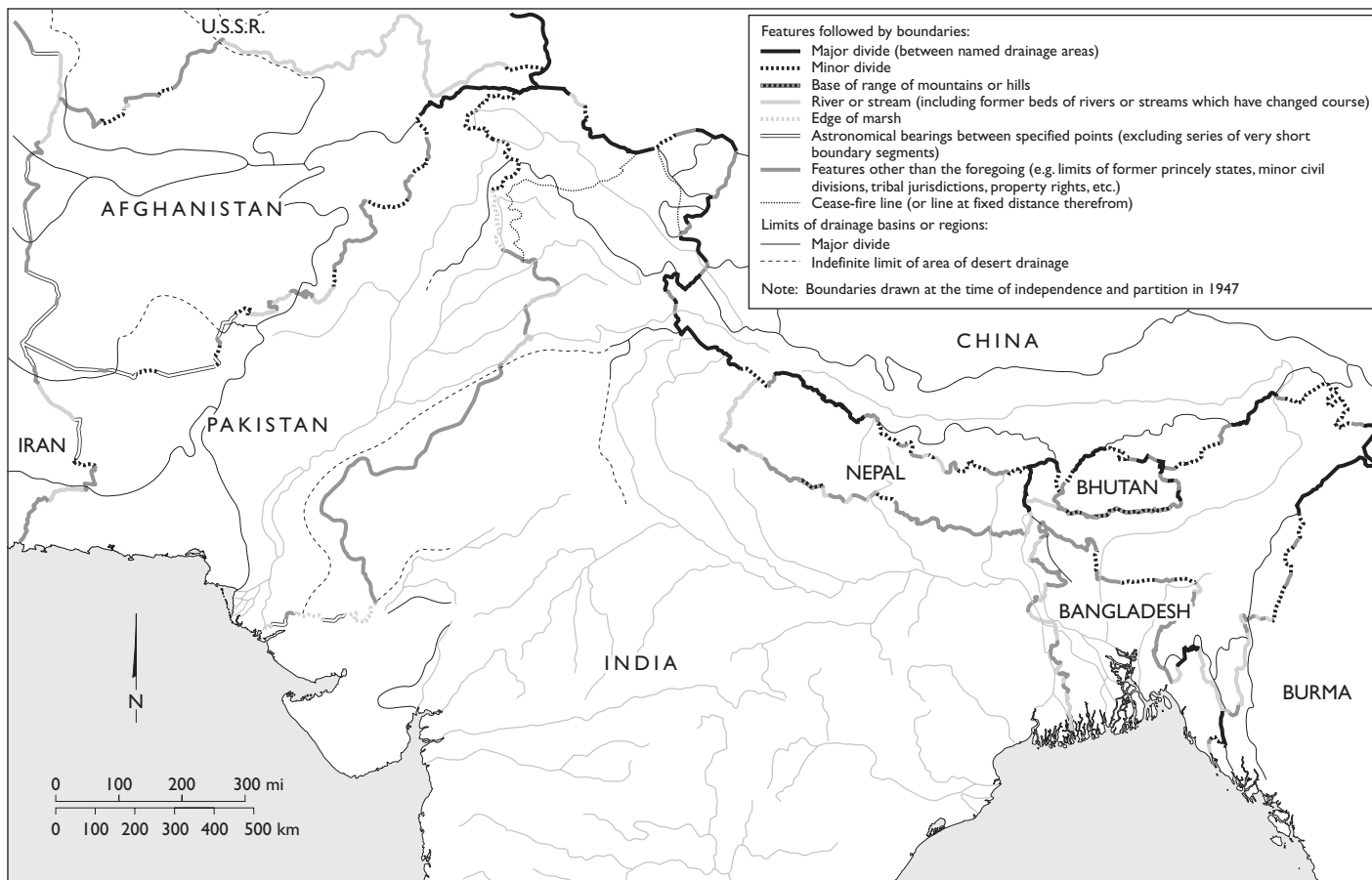
The economic and strategic flaws in the division were seen almost immediately, for when India and Pakistan went to war in 1948 over Kashmir, India stopped all waters from flowing into Pakistani canals. The stalemate



View of the Ganges Canal, works, and workshops in 1853. (University of Minnesota Libraries, Ames Library of South Asia)

continued for more than a decade, although in 1951, David Lilienthal, the head of the Tennessee Valley Authority, called for the World Bank to mediate the dispute. In the last month of 1960, the two countries reached an agreement, and the Indus Waters Treaty was signed. In essence, the agreement called for unrestricted use by India of the waters of the Sutlej and Ravi, in return for India's helping to finance new canal works in Pakistan. Pakistan gained unrestricted access to the three western rivers (www.stimson.org/southasia).

The Indus Waters Treaty has often been held up as a model for agreements on international waters, but the treaty has faced difficult times; when Pakistan and India are at loggerheads, which is not infrequently, the possibility of scrapping the treaty is often raised. Currently, the two countries are in dispute over India's plans to build a hydroelectric dam on the Chenab River, in the high reaches of Indian-controlled Jammu and Kashmir. Pakistan claims that the project violates the 1960 treaty, but India counters that its payments for Pakistani projects make the protest moot. A neutral arbitrator, as called for in the treaty, has yet to be appointed.



The Partition of India.

THE PARTITION OF BENGAL

If the environmental consequences of the partition of the Punjab seem complex, the riparian impact of the award in Bengal was Gordian. The boundary award in Bengal was more than six times as long as that in the Punjab. Furthermore, the decision instantaneously created some 54 international rivers. As Tan and Kudaisya (2000, 230) have aptly noted, the partition in Bengal "imposed artificial transnational borders over a unified natural landscape formed by one of the largest deltas in the world. . . . [T]hese boundaries continue to exact a heavy toll in terms of environmental and social costs."

As in the west, the award seems to have been made with little thought to the geography of the region. Calcutta, as expected, was given to India. In order for the port city to continue to function, however, the Ganges had to flow unabated into the Hooghly and then to the Bay of Bengal. As a consequence, Gangetic districts containing some 1 million Muslims were awarded to India. Crucially, the boundary decision also made the Ganges the international border between East Pakistan and India for 63 miles before the river briefly entered East Bengal. Since this 63-mile portion of the Ganges was considered to be an international ecological marker, the river only officially entered East Pakistan (later Bangladesh) much farther downstream than the physical terrain would suggest. According to international water laws, this demarcation made Bangladesh the lowest of the four riparian nations (China, India, and Nepal being the others) through which the river flowed. As a consequence Bangladesh has, under international law, few riparian rights in terms of water control; the other three nations have the ability to divert the waters before they reach the former territory of East Bengal (Nishat 1996, 64).

This was precisely the situation facing East Pakistan in 1951, when India first proposed the construction of the Farraka Barrage about 10 miles upstream from the international border. India claimed that the barrage was essential for diverting water from the Ganges to the Hooghly, in order to flush out the silt accumulating in the port. Pakistan's protest slowed the project until 1971, when Bangladesh gained its independence, in a large part thanks to India's intervention. In gratitude the new nation agreed to the diversion project, which started water diversion in 1975 (Nishat 1996, 60–62). By then, however, the bloom had worn off the happy relationship between the two countries. Although agreements to share the waters of the Ganges were in effect for most of the period from 1976 through 1989, the provisions carried no guarantees that India would provide Bangladesh with the agreed amount. After 1989 there were no discussions for some six years, until a 30-year water-sharing pact was signed in 1996. The pact,

however, apparently has done little to stem the environmental damage to Bangladesh which has amassed since the barrage was built.

ENVIRONMENTAL IMPACT ON BANGLADESH

The loss of water to India has affected Bangladesh in almost every sense possible, from its forests to its ports. Although agriculture may have been hit the hardest, every ecological niche within the country has felt the sting. The ramifications of the barrage present a chilling example of the tangential effects that such a loss of water can cause, and as such, need to be examined in detail.

The immediate consequence was a drop in the flow of Bangladesh's main Ganges tributary, the Gorai River. This river is critical to the morphology of Bangladesh, for the fresh water from the Gorai tempers the salinity of the delta as it nears the Bay of Bengal. Of equal importance, the river supplies fresh water to the fragile mangroves of the Sundarbans, the last refuge of the Bengal tiger. Salinity has subsequently become a major concern in the Sundarbans, as it has started to kill the primary tree species, the sundri; aside from endangering the mangroves' continued existence, it further limits the habitat of that great endangered species so associated with Bengal. The opening of the barrage created a vicious cycle: The Gorai and other tributaries were so low that they no longer had the force to carry silt into the delta, and so the river beds filled with silt, further limiting the effectiveness of the rivers to transport silt and sweet water farther into the deltaic region.

The depletion of groundwater caused by the barrage has also been dramatic; in some places the water level fell by 10 feet. This has led to dry wells, has affected soil moisture, and has produced a serious public health hazard. Increased levels of total dissolved solvents, such as chlorides, chemical fertilizers, and even cyanide, have made the water unsafe in many areas. An increase in waterborne diseases, such as diarrhea, cholera, and tetanus, has been associated with the lack of sufficient flow during the dry season.

Hardest hit has been agriculture, the livelihood of most Bangladeshis. Lower water flow has severely limited the usefulness of Bangladesh's irrigation system, causing planting to be delayed as long as two months. Soil salinity has made agrarian production even more difficult, limiting the amount of cultivable land. Estimates of agrarian loss between 1976 and 1992 have been calculated at 5.5 million tons of produce. Fishery, the second most important means of subsistence, has also been hurt. Salinity has been a problem in this area, too, limiting freshwater catches, which account for most of the fish production in Southwest



Spotted deer in the Sundarbans. (Mustafiz Mamun/Majority World/The Image Works)

Bangladesh. The lowered flow of the tributaries has led to wetland shrinkage, further damaging the fishing industry. Finally, navigation has been harmed. Bangladesh is best defined as a riparian ecosystem, and navigation is an integral part of the region in terms of economy and communications. In the monsoon season, water transportation is the only form of communication in many rural areas. Siltation in particular has led to limitations in water travel. Ferry ports have been forced to relocate, and channels have become too shallow for navigation (Nishat 1996, 64–79).

Clearly, the divergence of one river has had multiple effects on Bangladesh. The lowering of water flow has affected the economy, communications, public health, and endangered species. It is a tragic, yet telling example of the multifaceted historical changes caused by one intervention into the natural flow of one river.

CONCLUSION

Although elements of environmental activism were involved in the independence movement's ultimate success, the results of the subsequent rapid colonial

disengagement had severe consequences to the ecology of the subcontinent. By focusing on the political rather than the ecological, the Radcliffe awards in fact increased political tension between the two, then three, countries. The results are still points of contention in contemporary South Asia.

It is perhaps baffling, then, to learn that while independent India and Pakistan naturally threw off the dressings of imperialism, they embraced one of its major tenets. Modernization, Western science and technology, and the commodification of nature were promoted by the colonial government as symbols of its superiority over indigenous practices and, indeed, civilizations. And yet, at the inauguration of the Bhakra Dam project 16 years after independence, India's first prime minister, Jawaharlal Nehru, touted this first large dam constructed in independent India (as well as all the others that soon followed) as "the new temples of a resurgent India." The cause and effect of this philosophy will be one of the issues explored in the final chapter.

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SOUTH ASIA SINCE 1947

In October 1963, in his dedication speech for the huge Bhakra Dam, Indian prime minister Jawaharlal Nehru made the following observation: “Bhakra, the new temple of resurgent India, is the symbol of India’s progress” (Dharmadhikary 2005, 3). That statement, often paraphrased as “dams are the new temples of India,” became Nehru’s environmental albatross. In the 40-plus years since his death, the phrase is still used as the most succinct evidence of his love for industry at the expense of the environment.

In truth, however, Nehru’s view was not that simplistic. This same prime minister had, several years earlier, expressed his concerns about large-scale projects. “The idea of having big undertakings,” he said, “or doing big tasks for the sake of showing that we can do big things, is not a good outlook at all” (Guha and Martinez-Alier 1998, 165–166). How then, do we reconcile these two statements? Given the chronology, it would seem that Nehru, and by extension the governing Congress Party, evolved from suspicion of large projects to idolatry. And yet the order of these two statements, perhaps, points to something else, and that would be the conflict that India and Pakistan faced immediately after independence: the need to balance environmental concerns with the desperate need for economic infrastructure. This final chapter will delve primarily into this contradiction. We will look at the environmental ramifications of large public works and industrial projects and the commodification of nature that accompanied industrialization.

The example of the renowned Chipko movement, which emerged as a response to the modernization theory of nature’s utility, will be the focus of the next section. This peasant organization became the model for grassroots environmental movements around the world. We will end by looking at the devastation caused by natural disasters in the past several decades. Before we begin, however, it is crucial that we contextualize the rapid industrialization, especially in Pakistan, India, and since 1971, Bangladesh.

At the time of independence, the subcontinent faced several immediate crises. Although India had an advantage in that it was formally the successor state to imperial India, and thus emerged with a basic military and administra-

tive infrastructure, both India and Pakistan lacked indigenously owned large financial and industrial institutions. Until the 1930s, development had been directed toward cash-crop industries, primarily jute and cotton; even these were primarily foreign owned. By the end of World War II, South Asians provided the capital for almost 60 percent of industry; however, with the exception of products such as steel, which were needed for the war effort, much of the industrial base was in noncompetitive fields, for the colonial government did not want the colonies seizing business from British industrial bases. As a result, "nationalists accepted with near unanimity the objective of economic development towards modern agriculture and industry on the basis of modern science and technology" (Chandra, Mukherjee, and Mukherjee 2000, 13, 24). As if to underline the immediate need for public works in general, and irrigation systems in particular, within three years of independence the government faced severe food shortages in various parts of the country and was forced to spend much of its foreign currency on grain imports. Given this shortage, as well as a natural desire for self-sufficiency that any nation, new or old, would like to achieve, it is not surprising that agricultural modernization would top the list of immediate technological concerns.

With increased irrigation and flood control its primary motivation, the government then looked to funding and modeling the projects. In the early 1950s, there were few choices; primary funding for such projects came from the World Bank, which was essentially controlled by the United States. The model for all the multipurpose projects was the Tennessee Valley Authority (TVA). The era of building dams without regard for the consequences to the environment was at its peak in the United States in the 1950s and 1960s (perhaps symbolized by government attempts to build dams outside the Grand Canyon), and as a result the TVA was the model advocated by the World Bank. Although these projects came to an effective end in the United States by the close of the 1960s, the World Bank continued to promote them in the formerly colonized world well into the 1990s (as we saw in the case of Nepal in Chapter 8). These projects promoted a series of large dams on a single river and its tributaries, which would provide irrigation, flood control, and hydroelectric power. A project that was considered successful in the American South was thus transported to all corners of the globe. Eurocentric dismissal of local conditions and local knowledge had moved west.

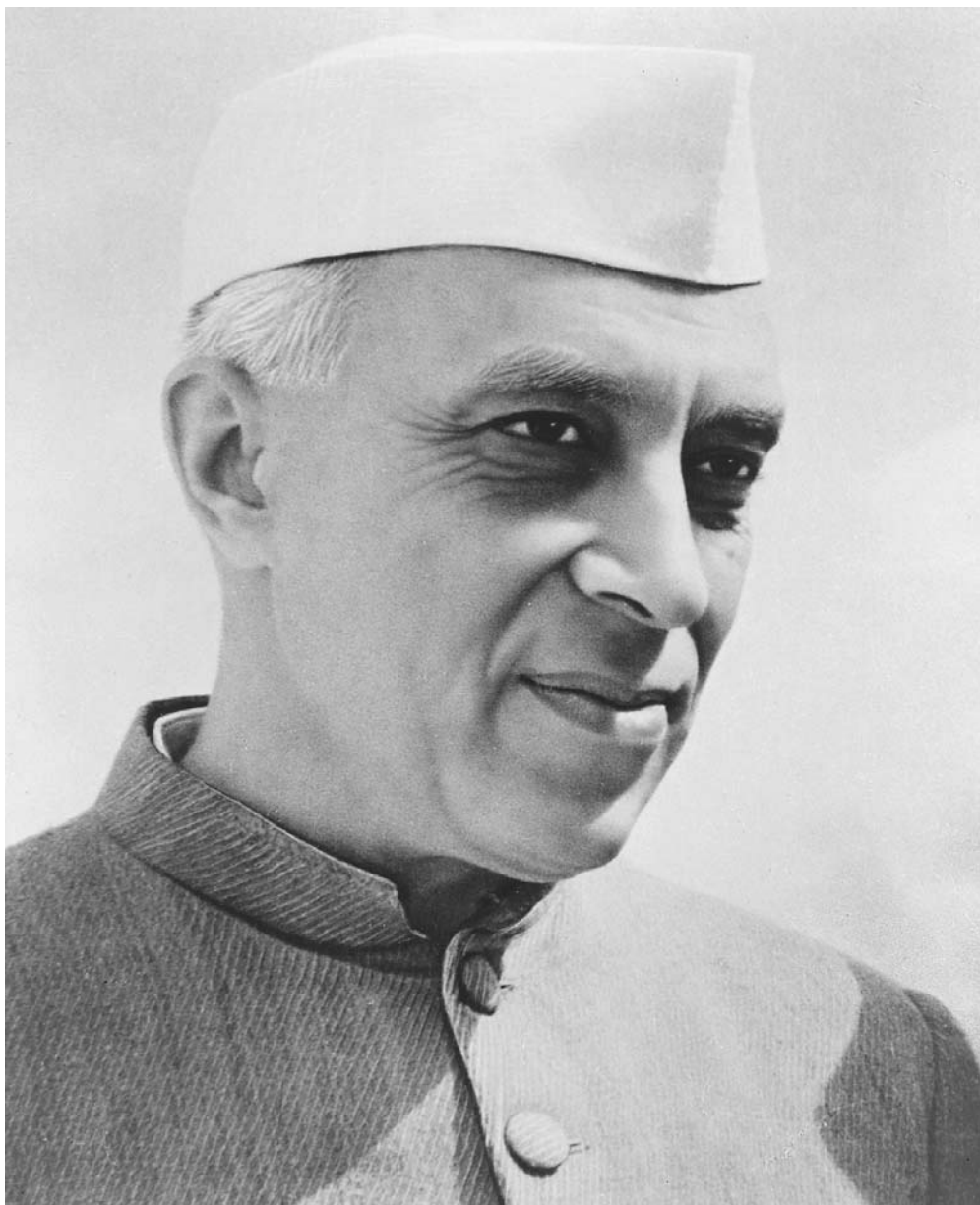
The promise of the green revolution also needs to be considered. By the early 1950s, scientists had genetically altered cereal seeds to produce what they called high-yield varieties (HYVs). These HYVs, particularly those producing rice and wheat, led to increased food production at a rapid rate. In 1963, India imported almost five tons of wheat; by the early 1980s India had a surplus of

30 million tons. The ecological and social consequences of the green revolution were only completely realized over a lengthy period of time; during the Nehru era these “miracle seeds” were seen as India’s path to self-sufficiency (Chandra, Mukherjee, and Mukherjee 2000, 411–413).

To take advantage of the HYVs, however, implementation of new technology was essential. Among the requirements was a massive increase in irrigation and the introduction of pesticides and chemical fertilizers. Additionally, tube wells were essential where irrigation systems had not yet been built, as well as tractors and other farm equipment. The environmental consequences of this revolution were later realized to include a rapid drainage of groundwater, poisoning from the pesticides that spread throughout the food chain, salinization, and leeching. This hazard was underlined in a study commissioned by the Punjab Water Pollution Control Board, which was released in late November 2007. The commission found that pesticides and heavy metals had indeed entered the food chain, causing kidney cancer and DNA mutation (www.bbc.co.uk). HYVs also demanded a change to monoculture, because the fertilizers and pesticides did not allow organic growth to continue.

The social consequences were equally grave. To purchase the equipment and agricultural supplies required for the green revolution, peasants were forced to go into debt. Once they had switched to HYVs, they were tied into the market economy in ways they had never imagined. For example, during the oil shortages of the 1970s, prices for chemical fertilizers escalated. When poor farmers could not afford to purchase the fertilizer, they lost their crops, land, and equipment to moneylenders, who sold the plots to wealthy large landowners. The disparity between rich and poor increased. Nor was it easy to return to organic farming. The soil had to lie fallow for long periods for the natural nutrients to emerge and replace the chemicals. The most contentious issue of all, however, was the massive displacement of people and loss of land caused by the building of the large dams. Eventually, the government’s broken promises to these displaced people were a major catalyst for the emergence of grassroots opposition movements, which continue to work against large dam projects. In the 1950s, however, few of these problems had been properly assessed.

Finally, Nehru was a socialist, and one of the founders of the Non-Aligned Movement (NAM), which, during the cold war advocated a course for newly independent nations to follow. Nehru and the NAM firmly believed third-world countries (to use the terminology of the time) could pursue a different foreign policy, one that put them in neither the Soviet nor the Western camp. In the early years of the cold war, the United States refused to recognize such a policy; nations that claimed nonalignment, particularly if they had socialist leaders, were considered to be communist leaning. As a result, relations between the two



Jawaharlal Nehru, who held office from 1947 to 1964, was the first prime minister of independent India. (Library of Congress)

countries chilled fairly shortly after independence. In this context, the Soviet model for rapid industrialization, based on five-year plans (FYPs), became the early pattern for Indian industrialization. The Nehruvian FYPs have received, in hindsight, severe criticism by many economists (much of it deserved), but given Nehru's goals and the political climate of the 1950s, his decisions were eminently rational. Nehru saw such large projects as tools for uniting a newly

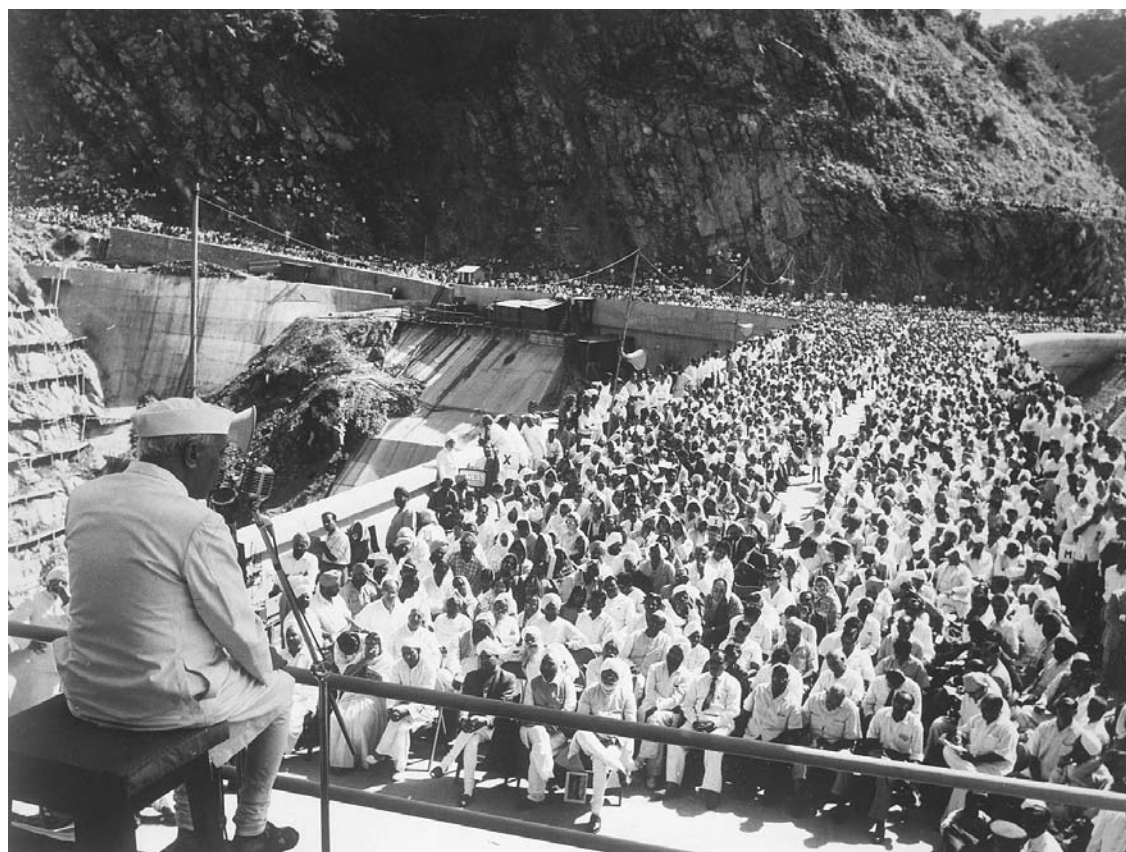
created, diverse nation. He also saw them as the great leveler. As he said, with great sincerity, in 1953, "I shall not rest content unless every man, woman and child in the country has a fair deal and has a minimum standard of living" (Chandra, Mukherjee, and Mukherjee 2000, 131). Nehru perceived rapid industrialization as the quickest method to reach this goal.

PUBLIC WORKS, INDUSTRY, AND COMMODIFICATION

Given this background and Nehru's fervent belief in the powers of modern science and technology, the Indian government soon began planning for rapid economic growth. The first FYP focused on the agrarian sector, which meant that a large percentage of the budget went to the TVA-inspired Multi-Purpose River Valley Development (MPRVD) schemes, as the government called them. During the very first complete year of independence, some 160 large dam projects were considered (Swain 1997, 823). The prime minister considered these projects so crucial that he micromanaged them as head of the planning commission. Although central management of public works had, at times, been practiced during the long evolution of India from colony to nation, never before had the governing head of the subcontinent taken direct control (Brecher 1959, 520).

Of particular importance for our study, in April 1945 the Planning Commission established the Central Water Irrigation and Navigation Commission (CWINC). The CWINC soon declared its supremacy over all state public works commissions and projects, as a 1951 memorandum to the chief minister of Orissa concerning the recently approved Hirakud Dam project shows: "The CWINC is a part of the Government of India. . . . The sanction of Orissa government with regard to any proposal of the CWINC has not been sought or made" (D'Souza 2006a, 190–191). From the very birth of the nation, public works were to be controlled centrally rather than locally. This was as true in Pakistan as it was in India. To evaluate the results of this policy, we will briefly look at the outcomes of five projects, three in India, one in Pakistan, and one in Bangladesh.

The Bhakra Dam was the first major project completed in India, and it has long been an icon of the success of large dams in India. As the first, the dam's symbolic significance naturally increased its status across the Indian nation; Bhakra was the dam Nehru showcased as the new temple of India. It is easy to see why the central government was so pleased with it. Partition had cut the Punjab, "the breadbasket of India," in half, and the dam seemed to restore the state's reputation for abundance. Over the years, as the legend of the Bhakra-Nangal Project has evolved, the dam has been given credit for the green revolution, and for being directly responsible for returning the Punjab to its former



Nehru at the dedication of “the new temple of resurgent India,” Bhakra Dam, on November 5, 1963. (Bettmann/Corbis)

position, and, indeed, making India self-sufficient. So powerful has this image become that contemporary proponents of big dams still hold it up as the mythic example of the incontrovertible benevolence of MPRVDs. In late December 2001, for example, the chairman of the most contentious contemporary MPRVD, the Narmada Sardar Sarovar project in Gujarat (see Case Study C), responded to critics by claiming that the project would do for the Narmada what Bhakra had done for Punjab and Haryana, “providing 70 percent of the food production of India. Like this Gujarat will also be able to provide for the whole country” (Visvanathan and Parmer 2003, 7–8).

In 2005, an Indian NGO decided to investigate the legend to discover how many of these claims were true. The subsequent portrait that the organization painted shocked many. In their study (Dharmadhikary 2005), the research team claimed that the project was far less successful than advertised, had been given credit for accomplishments on which the project had little or no influence, and had had negative consequences that had been glossed over. Among these was the

fact that the green revolution appeared in the area some 12 years after the inauguration of Bhakra. The study's other revelations included the fact that although electricity was produced early in the project, none was given to Bhakra village until 1970; rather, it was diverted to industrial centers. Irrigation canals were so ineffective that peasants lost the steady supply of water essential for HYVs. Available groundwater, forests, and wildlife decreased because of poisons in the pesticides and fertilizers. Finally, the report noted that the fate of the 36,000 displaced people, most of whom have still not been fully resettled, had gone largely unnoticed and unmitigated (Narain 2005; Schneider 2005). The report led to a huge backlash from dam supporters, and it has added to the contentious debate concerning the utility of MPRVDs that continues in India currently.

Although the Bhakra-Nangal Project may have provided the iconic temples of new India, the first scheme to be introduced as India's example of multiuse projects was the Damodar Valley Project (DVP). Originally conceived as a response to the devastating Bengal famine of 1943, and approved by parliament in 1948, the Damodar Valley Corporation (DVC), the semiautonomous organization authorized to build and run the project, was modeled on the Tennessee Valley Authority (TVA) more directly than any other project of its time. As Daniel Klingensmith has noted in his important study of the DVC, the Damodar project exemplified the type of development, in both physical and social terms, that TVA chief David Lilienthal imagined when he described the Tennessee Valley as representing "One Valley—and a Thousand" (Klingensmith 2007, 10). Although we need to be careful of reductionism—of reducing complex issues to simplistic explanations merely to make a point—there is nonetheless an ideological stream that flows from 19th-century colonial views of river control to those of a century later. An earlier chapter noted Arthur Cotton's argument in 1858 that a "delta is a delta" (Hill 1995, 51). In that same year, while commenting on a study of the Mississippi River embankment project, Captain John C. Harris of the Bengal Public Works Department made the claim that by "substituting the word 'Mohunuddy' [the Mahanadi River] for Mississippi . . . chapter after chapter of that admirable work may without alteration be read as a report on the former" (Government of India 1859). In 1954, almost a century later, Meghna Saha, the proclaimed architect of the Damodar Valley Project, wrote that "rivers and engineering have no nationality" (Sengupta 1999; Klingensmith 2007, 110). Although engineers and administrators of the DVC realized that there were unique natural differences between the Tennessee Valley and the Damodar Valley, the connections nonetheless show the influence of the attitude of universalism that seemed inherent in public works planning at the time.

The Damodar watershed is located in West Bengal and Jharkhand, which at the time of construction formed the southernmost portion of the state of Bihar. Covering an area of more than 9,300 square miles, the valley seemed to be the perfect location to duplicate the TVA (Saha 1979, 273). After the flood and famine of 1943, the Government of India turned to David Lilienthal to propose an adviser for the Damodar project, and in 1944 William Voorduin was dispatched by the TVA chairman to act as an adviser to the colonial government. Within six months Voorduin had developed a plan for the Damodar Valley that included eight dams, a barrage, a thermal power station, and a huge network of irrigation canals. Local knowledge was neither pursued nor taken into account. As Klingensmith noted, Voorduin “looked at Bihar and Bengal and saw the American South” (Klingensmith 2007, 71–76).

The Damodar Valley Project was meant to mirror the Tennessee Valley project administratively and structurally. Under the leadership of inaugural chairman Sudhir Sen, the project would be run as a corporation (the DVC) that would be largely autonomous and apolitical, answering only vaguely to the Ministry of Irrigation and Power in New Delhi. Dams were merely an aspect of the overall progression of the valley. The project had aspects of the social experimentation that had helped generate the iconic stature of the TVA in the United States. As Sen envisioned the changes, resettled cultivators would become well-paid laborers on large farms; cheap electricity and irrigation would lift all boats in the Damodar Valley (Klingensmith 2007, 176–177). Gone, apparently, would be large zamindaris, as well as the stigma and harsh life associated with being a landless laborer.

Such radical change required the unqualified support of the government, and although Nehru may have been enamored with large dams, he was also a political creature. In the early years of independence, the Congress Party and its leadership were still learning the game of political control; one of the first lessons was that in order to maintain a political advantage in Bihar and Bengal, the support of the large landholders was crucial. Although it is true that zamindari abolition commenced across India in 1949, legislation and enforcement were often two separate issues. As a result, because of a political eagerness to placate the local elite, the DVC never received the autonomy from the state governments of Bihar and West Bengal that it had been promised.

Educating the peasantry about the project proved difficult as well. Long-term advantages were not explained, so cultivators only knew that water had become more expensive through irrigation. Here too politics played a role; the new water sources were proclaimed to be a gift from Congress, but any rising prices were blamed on the DVC. In the end, the project displaced some 93,000 people, many of whom, rather than settle in the new, model villages,

demanded payment instead, often moving to Calcutta, hoping to make a better living.

By 1949, the DVC was already facing criticism. Between 1949 and 1955, the corporation was forced to borrow \$38 million from the World Bank; as a result the project was soon strapped for cash, and the second phase of the project, which included four more dams, was never enacted. In 1952, the government of India established the Rau Committee to review the progress of the project. Although largely congratulatory, the image of the Damodar Valley Project as a boondoggle soon spread. By the late 1950s, the DVC had lost most of its autonomy, and a tired Sudhir Sen resigned the chairmanship in 1958 (Klingensmith 2007, 187–194, 202–204. 251).

Of the eight dams proposed in the original plan, only four were completed. According to the World Commission on Dams, this has led to ruinous siltation in the upper basin, while the lower basin often remains submerged for six months of the year (www.dams.org). The DVC is still a subject of controversy. Recent essays have rediscovered the writings by Kapilprasad Bhattacharjee, a Bengali engineer educated in France, who in the 1950s evolved from a promoter of the Damodar Valley Project and the Hirakud Dam in Orissa to an opponent who predicted that the Damodar project would lead to massive siltation, forcing the building of a barrage at Farraka; as we now know, he was prescient. (Sengupta 1999; Nandy 2001).

The final project we will detail is the aforementioned Hirakud Dam on the Mahanadi River in Orissa. The roots of this project can be found in the middle of the 19th century; indeed, Arthur Cotton was referring to flood control along the Mahanadi when he issued his famous statement about the universality of deltas in 1858. From 1855 to 1856 a great flood struck Orissa, leading to the appointment of Cotton as a temporary adviser to the government of Bengal. Among the solutions to the flooding suggested by Public Works engineers were those based on flood-control plans devised for the Ohio and Mississippi rivers in the United States, as well as embankment policies devised in France (Government of India 1859). Instead, as we saw in Chapter 7, Cotton recommended that irrigation and flood control be privatized and put under control of the East India Irrigation and Canal Company. This scheme and its aftermath resulted in a disastrous series of floods, leading in 1928 to a report by a Committee of Experts, which concluded that “the problem in Orissa is not now how to prevent floods, but how to pass them as quickly as possible to the sea, and the solution is in removing all obstacles which mitigate against this result” (Cousins 1933, 133–134).

Although the committee urged the dismantling of all artificial flood-control devices that hindered water dispersion, it was already working in the shadow of

the TVA. The seeming magic of multipurpose dams wove its spell over the technocrats observing the Mahanadi in the early 1940s. In November 1945, the Orissa Multipurpose River Conference was held in the province, during which the chairman, B. R. Ambedkar, announced the result of the consultations: "Orissa must therefore adopt the method which the United States adopted in dealing with the problem of its rivers. That method is to dam the rivers at various points to conserve the water permanently in reservoirs" (D'Souza 2006a, 192).

The project, as devised by CWINC chairman A. N. Khosla, would comprise three dams on the Mahanadi, generating 200,000 kilowatts of power and irrigating well over 2 million acres. In fact, only one dam, the Hirakud, was ever completed. Almost immediately there were objections from the easternmost regions of the province, where the reservoirs would be situated, and where loss of land from inundation and the displacement of families would be extreme. As a result, the other two dams were scrapped. Indeed, as Rohan D'Souza suggests, fear that the Hirakud would also fall to political pressure may have led the CWINC to proceed at an unprofessionally hasty pace when designing and building Hirakud. The foundation stone for the dam was dedicated on March 15, 1946, only four months after the conference that had proposed the dam, and a full 15 months before a feasibility study of the project was completed. Nonetheless, construction was begun in 1948, and the dam was completed 10 years later and put into operation in 1959. At the inauguration of the dam during the whirlwind days of 1946, the governor of Orissa dedicated the project by proclaiming that "flood, drought and famine will be banished" from the province. It would not take many years to discover how tragically ironic those words were (D'Souza 2006a, 192–210; D'Souza, 2001, 4).

The immediate controversies caused by the project were similar to those at Bhakra and Damodar. Reports vary as to the exact number of people displaced by the dam, but the official government figure is 110,000, which studies from the World Dam Commission and other NGOs suggest is conservative (www.dams.org). In addition, over the past decade water that was earmarked for irrigation has instead gone to industry (Panda 2007). Finally, the dam has done little to stop flooding, either natural or artificial. In July 2001, more than 100 people died and hundreds of villages were inundated when authorities were forced to open most of the Hirakud gates, for fear that the reservoir would overflow from the monsoon accumulations (D'Souza 2001, 4; Government of Orissa, August 4, 2001).

The controversy over the Kalabagh Dam on the Indus in Pakistan has added several twists to our knowledge about the impact of large dam projects. Initiated in 1953, over the next two decades it evolved from an irrigation project into a hydroelectric one. Aside from the usual contentiousness seen in other instances—

problems with displacement, continued flooding, waterlogging, and more—the project has also increased tension among the four states of Pakistan. In particular, it has deepened the animosity toward Punjab, by Sindh, Balochistan, and the Northwest Frontier Provinces (NWFP). The latter three states have often felt secondary to Punjab, particularly since the capital was moved from Karachi to Islamabad. There has been a sense that Punjabis have controlled more than their fair share of the political and administrative infrastructure of the country. The Kalabagh project brought this to the forefront. The Northwest Frontier Provinces noted that while the dam would be located in its borders, the revenue-generating power turbines would be in Punjab. Sindh, through which the Indus flows to join the Arabian Sea, argued that as the lowest riparian state, it had the right under international law to veto the project. The lower province has already faced increased salinization as lack of river water from earlier dams in Punjab has raised the salt levels in the delta. As a result of continued suspicion and distrust, the project remains in limbo (Khan undated).

Finally, Bangladesh offers an example of how ecological change can become a catalyst for open rebellion. In 1962, the first hydroelectric dam was completed in East Pakistan. The Kaptai Dam, located in the Chittagong Hill Tracts, was constructed with a reservoir that submerged more than 250 square miles. Included in this were 10 square miles of forest, along with 40 percent of the cultivable land of the Hill Tracts. As was often the case with large dam projects, those most affected were tribal peoples, especially the Chakmas, none of whom had been consulted before the project had been approved. They practiced swidden agriculture and used forest products extensively. Magnifying the anger of the adivasis was the fact that some 100,000 were displaced, without adequate compensation or with offers of resettlement far from their homelands. Some 20,000 moved to Burma, and 40,000 more migrated to unsettled hill tracts in India; in both cases they had no rights of citizenship. The environmental damages caused by the dam quickly became obvious. With fewer acres for swidden, the available land soon became overcropped, leading to a large decrease in soil fertility and erosion; fewer forests also had a severe impact on the population (Government of Bangladesh 1975, 1–26; Samad undated).

The adivasis began to see a conspiratorial aspect to the project almost as soon as it was completed. Thousands of Bengalis migrated to the area, drawn by the lure of new employment opportunities; they were often viewed as carpetbaggers who were taking advantage of the displaced tribal migrants. The new residents tended to receive the superior positions; Chakmas and others were relegated to menial employment. The constitution of Bangladesh, enacted after independence from Pakistan in 1971, seemed to confirm their suspicions, for it institutionalized the primacy of Bengali culture and language. When a

delegation from the Chittagong Hill Tracts petitioned the president for designation as an autonomous region, the delegates were told that they needed to accept their sacrifices and begin to consider themselves Bengalis. As a direct result of the large dam, and the subsequent treatment of the indigenous population, an armed guerrilla insurgency began in 1972, which continues in a modified form today.

The five projects detailed here are representative of the 4,000-plus large dams across India. The refusal to incorporate local customs and knowledge in the MPRVDs had unexpected consequences for the people and land of India's river valleys. Referring to the Damodar Valley Project, Klingensmith has aptly suggested that the large dam schemes should be viewed not in terms of provincial and state development, but rather as the "ideological needs of the colonially trained, professionally educated, Indian middle classes, and of postwar middle-class American professionals as well" (Klingensmith 2007, 209).

The link between multipurpose dams and industry has had profound effects on the environment and Indian society as well. Although many of the projects have been built in areas primarily populated by the depressed castes and classes (dalits and adivasis), the benefits of those projects have often favored industry over agriculture. Much of the electricity generated by these dams has gone to businesses rather than to the local inhabitants. In addition, water promised for irrigation has been diverted to industry. Furthermore, the impact of this favoritism on the environmental history of urban India has been extensive. As Amita Baviskar has noted, massive industrialization in New Delhi has had social consequences that are inherently tied to negative environmental changes, such as the massive pollution that has accompanied urban industrial growth in the capital and other major cities. Although each year finds new incentives for new industries to locate in cities like New Delhi, the needs of the labor force to run these industries are bypassed. Land is set aside for the factories, but it does not include tracts for housing and sanitation for the workers. As a consequence laborers are forced to set up jhuggis (slums), sometimes in middle-class neighborhoods. Bavaskar has argued that "bourgeois environmentalism" has led many city dwellers to look at public parks as their own private neighborhood parks. Thus, in 1995, when a young man visited his jhuggi-dwelling uncle, he was confronted with the fact that 10,000 people shared three public toilets. When he entered a public park to relieve himself, he was beaten to death by residents and local policemen. This tragic event tells us a great deal about the layers of urban environmental history, as well as the seams that begin at rural Indian dam sites and end in residential neighborhoods in middle-class India. Furthermore, Bavis-

kar notes, the urban poor are often trapped by an environmental conundrum. As municipal corporations in India begin to legislate and enforce stricter pollution laws, industries are closed and the jhuggi-dwellers are thrown out of work. In the three years before her essay appeared in 2002, Baviskar claims that some 2 million workers were dismissed as 98,000 industrial units were shut down. Since this paralleled a court order that all jhuggis on Delhi public property be torn down, the workers found themselves homeless and unemployed (Baviskar 2002). One environmental concern (pollution) was addressed, but the result fertilized even more problems, especially in terms of sanitation and disease.

A far more sinister industrial disaster occurred in Bhopal in late 1984. Union Carbide, an American chemical corporation, had built a pesticide plant in Bhopal in the early 1970s. Although the plant had stopped production in the early 1980s, the remaining supply of chemicals lodged at the plant had not been destroyed. On the night of December 3, 1984, faulty faucets allowed a large amount of water to mix with the abandoned chemicals, forming a huge poisonous cloud over the city. Immediate deaths were estimated to be between 3,000 and 15,000; total deaths will not be known for decades, because people are still succumbing to the effects. The chief executive officer of Union Carbide has been charged with manslaughter but has never been extradited from the United States. Union Carbide originally blamed the leak on Sikh terrorists; when this charge was ridiculed and subsequently disproved, the company made a partial settlement with some of the victims, which amounted to between \$300 and \$500 per compensated individual. In 2001, Dow Chemical purchased Union Carbide, immediately disavowing any responsibility for Bhopal's victims. Such callousness strengthened the various protest groups that still today are demanding answers and accountability (Bhopal Medical Appeal 2003). To further anger the local population, when the cleanup gradually began, it was discovered that Union Carbide's waste had been seeping into the wells and groundwater, which had led to severe mercury poisoning as well as that caused by the cloud (Vosters 2003). The Union Carbide disaster in Bhopal remains the largest industrial accident in the history of the world.

Public works and industrialization affected the social ecology of South Asia in ways never envisioned by Nehru when he uttered his famous words that began this chapter. The people whose lives were changed by the commodification, loss of property, and the abolition of customary rights that accompanied these monuments to modernization did not, however, follow a lesser-known dictum of Nehru's, in which he advised the adivasis about to be displaced by Orissa's Hirakud Dam, that "if you are to suffer, you should suffer in the interest of the nation" (Roy 2002, 47).



A Bhopal jhuggi, 11 days after the disastrous poisonous gas leak. The Union Carbide factory is in the background. (Alain Nogues/Corbis Sygma)

GRASSROOTS ENVIRONMENTAL MOVEMENTS: THE EXAMPLE OF CHIPKO

Throughout this chapter we have detailed, however briefly, the victims' various responses to the environmental repercussions of the projects described. In the early days of sovereignty, many South Asian nationals, imbued with patriotism and trusting the promises of the government, were more than willing to sacrifice for their respective nations. As it became increasingly clear that the results of their sacrifice were primarily benefiting small, select groups, those affected by the projects began to make demands of their own. Bhopal saw the rise of an organization that sends victims to the shareholders' meetings of Dow, to remind them of their unspoken complicity. Ground-level protest movements emerged in Punjab, West Bengal, and Orissa, in reaction to all three of the Indian river projects detailed. In Bangladesh, the multipurpose dam project was a primary catalyst for the birth of a separatist insurrection. The most famous riparian protest of them all, which is still in effect, is the one against the construction of multipurpose dams on the Narmada River. Because that movement is the focus

of Case Study C and was influenced by the organization detailed next, we will not dwell on it here. Instead, we will look at the earliest and equally famous Chipko movement, which began in the early 1970s, and became the model for Gandhian environmental movements.

The Chipko Andolan was the continuation of more than a century of activism against forest regulations (Ram. Guha 1989). Earlier chapters have described the methods of insurgency and protest used by forest villages; arson, appropriation of forest products, and refusal to fight fires were among the most common. In the 1970s, however, the Chipko (commonly translated as "to hug the trees") Andolan ("movement") added the Gandhian technique of active nonviolence to these techniques. Under the leadership of Sunderlal Bahugana and later Chandi Prasad Bhatt, the movement quickly gained national, and then international, attention for several reasons. One was that it was nonviolent; as NGOs emerged and were increasingly looking for nonviolent responses to government development, Chipko seemed to provide the solution. Another was the predominance of women and children in the Chipko Andolan. Women in India were particularly dependent on the forests for the livelihood of the family, as they, along with their young children, were responsible for the household. In this role they had to fetch water and firewood from the forests every day, but as the felling increased, it became more arduous to find the increasingly scarce necessities. This led the women and children to be vanguards on the front lines of the protest.

Chipko began in Uttaranchal, one of the far northern states, which is located in the Himalayas. Among the severe ecological effects of massive deforestation was the loss of topsoil, which absorbed rain. As a result, in 1970 flooding occurred that was the most extensive since independence. Because of the onrush of water and silt, the Ganges Canal became blocked, leaving more than 9 million acres of land without irrigation. To those affected by the disaster, the link between deforestation and flooding became increasingly clear. By the next year, villagers and forest dwellers had begun small satyagraha campaigns, protesting the denial of their rights to forest products and demanding the closure of liquor stores, which they saw as purposely inviting drunken indifference to deforestation by some villagers. In 1973, leaders in the region asked the government for a supply of ash trees so that they could make new tools for cropping. Although the peasants' request was denied, the government quickly consented to large allocations of ash trees for the Symonds Company, a sporting-goods corporation that needed the lumber for cricket bats. When the agreement with Symonds became public, the peasants, incensed, began a full-blown campaign for legal access to forest products (Ram. Guha 1989, 155–157).

The government's response to the agitation was to ignore it; not only did Symonds collect its ash, but in November 1973 the administration held another

timber auction. Felling was scheduled to begin on March 24 of the next year, but huge demonstrations forced the cancellation. Instead, the government turned to duplicity, promising the men compensation for an earlier loss of land. On March 26, 1974, as soon as the men had left the villages, the lumberjacks appeared. A small girl saw them approaching, ran to the village of Renti, and alerted the women of the village. The women subsequently rushed to the forest, blocking the progress of the cutters. In the process, some of the women put their arms around the trees to protect them, and the Chipko Andolan was born. As the movement spread across the region, the government was forced to negotiate. It eventually agreed to a 10-year moratorium on commercial deforestation in the region and a reconsideration of a lease it had signed with Star Paper Mills for other forest products.

Why is the Chipko Andolan still considered so important to environmentalists, not only in South Asia but throughout the world? There are several reasons. Ramachandra Guha, in his groundbreaking study of Chipko, suggests that it provides the first instance of such widespread participation by women. As such, it is an example of an effective, total, grassroots environmental movement, one that transcends gender and age. It also became so successful and widespread that the government could not dismiss Chipko as simply petty selfishness (Ram. Guha 1989, 158–161). The most important aspect, however, was that Chipko provided a model for nonviolent environmental protest. As such, it has been copied from Africa to South America.

Some environmentalists have criticized the movement, arguing that it really was an example of competition over forest products rather than a true environmental action. Although it is true that the participants of Chipko Andolan were fighting for self-preservation rather than an ethereal notion of deep ecology, in the final analysis most environmental issues are fought for self-preservation. As the Narmada Bachao Andolan shows (see Case Study C), Chipko has left behind a legacy that affects environmentalism across the world.

NATURAL DISASTERS IN INDEPENDENT SOUTH ASIA

At the risk of concluding this final chapter on a morbid note, it is important to examine the spate of natural disasters that have hit South Asia over the past several decades. Much of this portion of the book has detailed the human effect of subjugating nature on both the environment and society. However, the relationship should also be viewed from the other side of the equation, which is sometimes romantically portrayed as “nature’s payback.” This is not an accurate depiction, of course, if only because the victims in both cases have been primar-

ily the same: the poor and the powerless. To make this point, we will look at a few natural phenomena that have affected the entire region, in the form of cyclones, earthquakes, and tsunamis.

Cyclones

Cyclones are formed in warm waters, and occur when a combination of atmospheric changes and winds moving in a counterclockwise motion come together. As the winds become funneled, they form huge waves that pound coastlines, causing massive flooding and, often, high death tolls, both human and animal. There is little difference between cyclones and hurricanes, apart from terminology: hurricanes are found in the Atlantic and Caribbean area, and cyclones are found in the Indian Ocean. In both cases, global warming has been suspected of increasing the number of cyclones and hurricanes in recent years (Radford 1999).

Cyclones have caused devastation, particularly in the Bay of Bengal, throughout history. They have produced more destruction and deaths in the postindependence era, however, because of commodification of nature. Massive deforestation in the Himalayas has played an especially significant role in the rise of cyclonic deaths, particularly in Bangladesh. The soil erosion caused by the destruction of forests has led to massive deposits of topsoil accumulation in the Bengal delta; some 500,000 tons are deposited in India and Bangladesh annually. Once the soil reaches the delta, it forms thousands of chars, or siltation islands, which are extremely unstable. Because they are composed of unanchored alluvial soil, they have no structural grounding for withstanding the storms. The waves and winds simply wash them away, along with the cultivators and animals who live on them. The very composition of the chars makes them both dangerous and desirable, for their alluvial soil is suitable for extremely productive cultivation. As we have seen in both this chapter and the last, land in Bangladesh has become both scarce and less productive, making cultivation of these islands a risk that peasants will take to support their families. In November 1970, a cyclone with winds over 130 miles per hour hit the coast of Bangladesh (then East Pakistan), producing waves measured at greater than 32 feet; the cyclone killed more than a half million peasants. In April 1991, another cyclone took, by a conservative estimate, 130,000 lives (Hill 1997, 163).

Bangladesh responded to these disasters by implementing a sophisticated early-warning system and building a large network of cyclone shelters containing food, clean water, and medical supplies. Not only has this cut down on mortality, but the system may well account for the low numbers of Bangladeshi deaths

from the tsunami of 2004. The most recent evidence of the effectiveness of the early-warning system came on November 15, 2007, when Cyclone Sidr touched down on the Bangladesh coast. With winds reaching 150 miles per hour, the effects were devastating. As of November 25 there were more than 3,000 victims; however, since the early warning had led to the evacuation of 1.5 million people, the death toll was much lower than it would have been in the past.

The state of Orissa in India, on the other hand, had no such advanced system in place when it was struck by a powerful cyclone in October 1999. In this case winds topped 150 miles per hour, sending waves higher than 20 feet crashing against the Orissan shore. Approximately 10,000 died over the next few days because of a lack of shelters, but the final toll may never be known. With only 50 shelters in the state, many Orissans, their homes destroyed and lacking food and clean water, were forced to survive on water contaminated by the carcasses of buffalo and other animals (www.reliefnet.org). An additional tragedy occurred with the virtual destruction of the facilities of the Nandankan Zoological Park, which houses rare white tigers. The loss of shelter forced the zoo to lodge 56 tigers in a confined space; in 2000, 12 of them died of a rapidly transmitted pathogen (Naidu 2000).

Earthquakes

The effects of earthquakes have been mentioned previously, most notably in Bihar during the independence movement, which helped produce the often-dissected disagreement between Gandhi and Tagore. Earthquakes since 1947 have often produced higher mortalities, if less dissonance, than the 1932 earthquake. A major earthquake occurred in Bihar and Nepal in August 1988, and the Republic Day earthquake in Gujarat on January 26, 2001, killed more than 20,000 people and left a half million homeless.

The most destructive earthquake of recent times, however, occurred in Kashmir on October 8, 2005. At 8:50 a.m. an earthquake measuring 7.6 on the Richter scale erupted in Pakistan-Administered Kashmir (PAK). With its epicenter located in the PAK capital of Muzaffurabad, the shock waves were felt as far away as New Delhi. The deaths in India-Administered Kashmir (IAK) amounted to 1,400, and four deaths occurred as far away as Afghanistan.

The greatest damage, of course, took place in PAK; 30,000 people immediately perished in Muzaffurabad. The city was so badly damaged that entire schools collapsed, which accounted for the large number of children among the dead. Entire villages were buried, so any final tally of deaths must surely be an estimate, and 3.3 million houses were destroyed as well. Matters only got worse

when winter approached. Much of the damage occurred in mountainous terrain, where communication and supplies were difficult at best during the winter months, and the collapse of roads made access almost impossible. The official toll of deaths was placed at 73,276.

In spite of the terror and destruction, some observers have found positive political aspects among the tragic natural ones. India and Pakistan opened five new points of entry in Kashmir to allow swift passage for those trying to find relatives and friends. Taking place as it did during the Iraq War, U.S. assistance and aid provided some badly needed goodwill at the time. Nonetheless, the aftermath of the earthquake still affects hundreds of thousands of homeless, destitute, and poor at the time of this writing.

The Tsunami of 2004

On the morning of December 26, 2004, an earthquake measuring 9.0 on the Richter scale occurred off the coast of the Indonesian island of Sumatra. Some three hours later, the aftershocks were still measuring 7.1. The earthquake produced enormous waves that traveled across the Indian Ocean at speeds exceeding 300 miles per hour. By the time they hit Sri Lanka two hours later, those waves submerged more than two-thirds of the entire coastline of the island. The north-east Tamil area particularly was hit hard, for it was in the immediate path of the epicentral waves. As with so many of the cases of environmental disasters described (artificial or natural), the poorest were the hardest hit. In this case it was the fishing communities; waves advanced inland as far as 540 yards, in the process destroying or severely damaging 80 percent of the Sri Lankan fishing villages and property. Fishing families also suffered the greatest loss of life. Children formed the majority of the official tally of more than 35,000 dead. This too emphasizes the impact on fishing communities, as many men were spared because they were out fishing and thus missed the waves. The number of homeless, estimated at 500,000, was particularly high around Jaffna, the main Tamil center in the north; some 20 years of war had weakened an infrastructure that was easily destroyed by the tsunami. Relief operations led to a period of cooperation between the government and the Tamil Tigers, one that has since ceased. In all, the economic damage to Sri Lanka was estimated at more than \$1 billion.

India's coastline was also severely affected by the tsunami; both Tamil Nadu and Andhra Pradesh felt the wrath of the waves. Tamil Nadu faced the worst of the storm, however; more than 80 percent of the deaths occurred there. The official death count was over 11,000, and 150,000 houses were destroyed. Like



Aerial view of tsunami damage on the western coast of Sri Lanka, January 5, 2005. Piles of debris remain where the massive waves struck homes in December 2004. (UN Photo/Evan Schneider)

Sri Lanka, India's economic costs were estimated to be more than \$1 billion. Here again the fishing communities were affected most.

Amazingly, Bangladesh suffered only two casualties from the tsunami. In part, shallow waters in the northern Bay of Bengal lessened the effect of the waves, but we should also give credit to the early warning system introduced along the Bangladeshi coastal area for protection from cyclones. Indeed, as a result of these and other factors, Kenya was more affected by the tsunami than was Bangladesh (www.worldbank.org).

CONCLUSION

The environmental history of independent South Asia can be defined by continuity and change. We have seen continuity from empire to republic in several forms. Commodification of nature did not stop in 1947; the Multipurpose River Valley Development schemes and massive deforestation testify to the continued iconic status of science and technology that first started in the 1830s. The victims of commodification have tended to remain the same as well. Adivasis, dalits, and the poor in general continue to be those most affected by natural and unnatural environmental disasters. What has changed, however, is the response of those who stood in the path of progress. From tree-hugging to nonviolent resistance such as refusing to leave reservoir sites, India's peasant population continues to practice the active resistance to perceived injustices that has been a dynamic of South Asian environmental history throughout its long existence. To end this chapter with another famous idiom of India's first prime minister, the relationship between humankind and nature in South Asia is still one of "unity in diversity."

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CONCLUSION

On February 5, 2007, the Cauvery Water Dispute Tribunal met to announce its binding decision for the allotment of the waters of the Cauvery River to the states of Tamil Nadu, Karnataka, Kerala, and the Union Territory of Pondicherry. It had taken the tribunal 16 years to reach a decision. In the process, the states had experienced protests, violence, resignations, and hunger fasts. As Parvathi Menon noted, by the time of the water award, “the Cauvery had assumed an existence of its own, shaping politics and life in the Cauvery basin” (Menon 2007, 4).

The roots of this controversial decision can be traced to the second century of the Common Era, when the Chola king, Karikala, commissioned the construction of the Grand Anicut. When Arthur Cotton viewed the Grand Anicut in the middle of the 19th century, he thought it so sophisticated that he had it refurbished, constructing irrigation work across riparian South India on the knowledge he gained from studying this ancient irrigation system. Only some 17 centuries after the first works, when the colonial government and the princely state of Mysore began competing for the river’s waters by commissioning massive dams, did the water sharing become contentious. In spite of 16 years of deliberation, none of the four regions involved have expressed complete satisfaction with the announcement (Iyer 2007, 639–643; Subramanian and Menon 2007, 25–27).

What does this story tell us about the use of environmental history for understanding South Asian history? There are some reasons that by now perhaps have become mundane: studying local culture, tracking the change in society and nature, understanding colonialism with more precision—all of these have been important in interpreting the history of the subcontinent. In the Introduction Roderick Nash’s observation on environment as a research tool started us on this multimillennial journey to the present. But there are, in particular, aspects of the broad scope of Indian history that make environmental history, if not uniquely suited to plunging the historical depths of South Asia, then especially valuable in decoding the nuances that such a long and great tradition has developed.

The first of these is the motivation of the peasant population that now, in the nation of India alone, is the largest in the world. The evolution of peasant-

nature reciprocity tells us more about societal change than any intellectual analysis of the region possibly could. From the Indus civilization, where the rudiments of Hinduism developed with gods of nature, to the protection of sacred groves that caused the British such consternation, the peasant population has realized that life and death depend on a sanctified relation with nature. This is not a suggestion that the agrarian understanding of nature was a romantic one; rather, it is a reflection of the cultivator's recognition that his survival depended on an intimate relationship with his surroundings. This was a pragmatic decision, influenced by the needs of the community, village, and family; the moral economy of the peasantry, which we described in the early pages of this volume, is proof of the dynamics entailed in this process. It is still found in contemporary South Asia; communities decide whether or not to join the green revolution or the Chipko movement based on their own self interest and their knowledge of the results of such actions in other places and previous times.

That being noted, the dependency of the rural population on its natural surroundings provides more clues about historical change than any other fragment of society can. Across the vast expanse of South Asia, local knowledge, uses of ecosystems, perceptions of nature, changes in the land, and the acceptance or rejection of ideologies toward nature imported from other cultures and societies provide integers for interpreting the code that explains change over time in the region. Simply put, environmental history provides a perspective that otherwise remains opaque when subcontinental history is viewed from loftier theoretical angles.

The second critical aspect involving the historical perspective is the challenge of interpreting South Asian history in general. Narrowing our topic simply to that of a comprehensive history of India exemplifies the problems historians face. How, precisely, do we define India, and how do we fairly and equitably narrate its story? Do we emphasize kingdoms? If we do, we are ignoring masses of people whose lives were not affected by regal evolution. Should we view India as a collection of regional histories? That too defeats the goal of comprehension. For decades elite history was the model—the “great man” theory of history, in which the Ashokas and Akbars and Curzons and Nehrus were the real forces of change. In spite of Gandhi's example that disproved this notion almost a century ago, this path is still the most traveled in general histories. Not only is such an approach one dimensional, it ignores large portions of South India's intricate precolonial history.

If we were to randomly set out in front of us a dozen comprehensive histories of India, whether focused on social, urban, intellectual, or any other historical discipline, they likely would all have one aspect in common: The books would

be arranged by political eras as defined by the British. Indeed, this volume is as guilty as any other of following that practice; for the sake of organization and clarity for those new to South Asia, this history pigeonholes the subcontinent in the same fashion as Mill's history in the early 19th century. This model is roughly designed on the following pattern: the Indus civilization, the Aryan invasion, the Mauryas and Guptas, the Muslim odyssey to India, the Mughals, the British, and independent South Asia. Although such an outline is not incorrect, it can easily marginalize huge swaths of society and time. Perhaps most problematic, however, is its suggestion that each political era provides a single and complete period in Indian history. The implication in so many volumes of this type is that once the British conquered parts of India, the history of Islamic India was over; or that independent India must be seen as a complete break with all that occurred over the two centuries preceding 1947. None of this, of course, is true. Many princely states, such as Hyderabad, carried on forms of Islamic governance until independence; they are still bastions of Muslim culture in South Asia. Many aspects of colonial influence, from language to the parliamentary systems of governance in India and Sri Lanka, are felt across South Asia. Nonetheless, discontinuity is still the most practiced paradigm for writing these narratives. That such a model is so common shows how difficult it truly is to write a comprehensive history.

Environmental history may help to lead historians out of this predicament, and to make that argument we turn back to the event that opened this conclusion. The relation between water control and power—political, economic, and cultural—is as old as the Indus Valley. Although methods changed over time, from earthen dams to MPRVDs, the purpose and results were largely the same. Whoever controlled the flow of water also controlled who received it, who was forced to relocate because of it, and how much would be paid for it. From the seventh century, when the Cholas and Pandyas began a five-century contest for control of the rivers and deltas of South India, through Arthur Cotton's disastrous privatization plan for irrigation in Orissa, to the massive dislocations caused by multidam schemes in independent India, the control and use of water provides a continuous thread woven into the fabric of India; it is not broken or cut with each new political period.

The use and abuse of forests provides another example that demonstrates the historical continuity of South Asia. From the evolution of the ancient perception of forest peoples as devils to be avoided to the medieval warrior mentality that looked at forests as strategic obstacles to victory that needed to be destroyed, we see how the view of forests and their relationship to society evolved. From this evolution we gather cultural markers that lead us down the path to understand change in its many manifestations. So evaluating this process

reveals suggestions that point to the change from hunting and gathering to settled agriculture and the subsequent rise of warrior groups attempting to conquer valuable cultivable land. If we carry this progression into the modern era, we might look for signals of the impact of modernity on South Asia. Deforestation for coffee plantations in Sri Lanka gives us a sense of the change of the nature of wealth, from product to commodity. Since 1947, the relationship between tourism and deforestation in Nepal signifies the emergence of “industrial tourism” as the primary economic commodity (Abbey 1968, 48–74). Following the flow of water and power from postcolonial MPRVDs to their final destinations and benefactors points to a politically powerful elite unlike any Gandhi may have imagined on the eve of independence. The point that needs to be emphasized, however, is that we should not rely simply on arbitrary political divisions to understand the history of South Asia. To use one last environmental metaphor, the flow of Indian history is better understood if it is allowed to run smoothly rather than if it is abruptly halted by artificial constraints.

Let me conclude this line of reasoning with a personal anecdote. In February 2007, I was riding on the back of a scooter along Tankbund Road in Hyderabad, the capital of the Indian state of Andhra Pradesh. Tankbund Road is sandwiched between a beautiful lake named Hussein Sagar, with its giant statue of Buddha in the center, and the inspiring Indira Gandhi Park. Striding the edge of the park is a series of marble statues of Andhra Pradesh’s great heroes. Of the two dozen or more icons that I did my best to study as we drove by, only one was of a European. It was not a likeness of a viceroy, nor a European member of the Indian National Congress, nor a monarch. It was, instead, a statue of Arthur Cotton, the English engineer who, by respecting local knowledge had built an irrigation system along the Godavari that successfully helped to control flooding and provide irrigation across much of the northern Madras Presidency. I was struck once again by how environmental history can provide such unexpected clues and depth to understanding South Asia.

Over the roughly 4,000 years covered by this volume, South Asia’s ecology and society have changed so much as to be virtually alien to a fanciful visitor from the earliest periods. However, there would be characteristics that he or she would recognize. The dependency on nature of the vast peasant majority of South Asia would be one. Continued reciprocity at the local level would be another. So too would be struggles involving control of resources. However, the visitor would immediately recognize the brightest and most familiar piece of the mosaic that is South Asia in its entirety: the respect and love for the land that is so abundant across the subcontinent. And so it seems completely appropriate to end as we began, with that greatest interpreter of and enthusiast for India’s

history and environment, Jawaharlal Nehru: “We live in a wonderful world that is full of beauty, charm and adventure. There is no end to the adventures that we can have if we only seek them with our eyes open” (N. B. Sen 1968, 19). The adventure that is South Asian history begins at that intersection where society and nature merge into one cohesive thematic trail that will continue to lead us on our exhilarating journey through the past.

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CASE STUDIES

CASE STUDY A: THE AGRARIAN SYSTEM OF MUGHAL INDIA

Beginning with the reign of Akbar in the last half of the 16th century, the Mughal Empire faced a peculiar contradiction in that continued success at expansion also provided the greatest opportunity for its decline. In a time of poor communication, the farther a regional governor or military leader was from the imperial center, the easier it was for an ambitious administrator in the periphery to establish autonomy. It could take months for the rulers in the capital to hear about an insurrection, allowing for the periphery to adopt a quasi-independent status for the region and its ruler. As we have seen in Chapter 5, Akbar spent much of his early reign battling his relatives for control of the throne. Thus, he was well aware of the potential for rebellion in the hinterland.

The Mughal historian John Richards has suggested that the empire had four entwined goals: military victory over all other contestants for power in India, conquest of new regions, introduction of public order (over the Mughal elite as well as the general population), and ever-increasing land revenue collection (Richards 2003, 32). The mansabdari system established during Akbar's reign incorporated all four of these demands. As an administrative-defense-taxation-collection device, the system brought a measure of stability to the empire that lasted for almost two centuries. In the process it changed the environment of India (particularly the Gangetic Plain) forever.

The mansabdari system found its roots in Mongol practice, but Akbar adapted it uniquely for India. Simply put, a mansab was a rank, given to the nobility and important officials, that was based on the number of cavalry a mansabdar (rank-holder) was required to maintain on behalf of the emperor, to whom the mansabdar swore his personal and complete loyalty. As such, loyalty was given to the absolute ruler and not to the state. In return the mansabdar received a salary derived from the cost of maintaining the cavalry. The system was based on a decimal structure with 33 ranks based on how many horses and men the mansabdar was required to provide, ranging from 10 horses and men, to 10,000. Any mansab over 5,000 was reserved for nobility.

Akbar also introduced a new administrative structure, one that still forms the basic bureaucratic infrastructure in India today. The basic unit was a *mouza*, which in time became synonymous with a village. A *pargana* contained several villages, while a *sarkar*, made up of a collection of *parganas*, was roughly equivalent to a district. Finally, the *sarkars* combined to make up the *subah*, or province. These were not simply administrative units, however; the various administrative divisions also formed revenue assignments within the *mansabdari* system. As such, taxation, collection, and administration were tied together. Furthermore, as David Ludden notes, the system played an important role in social homogeneity. By standardizing the units throughout the empire, Akbar was able to unify the region symbolically; the language of governing became universalized, lifting it above dialect and local standards (Ludden 2002, 83).

The method of payment to the *mansabdars* had a direct and dramatic effect on the land. *Mansabdars* were paid in revenue estates known as *jagirs*. These were not their private properties; rather, they were *parganas* from which the *mansabdar* was entitled to a percentage of the revenue. This percentage changed according to time and place; for instance, P. H. H. Vries suggests that under Akbar, “the *mansabdars* . . . received some eighty percent of all taxes via their *jagirs* [but] spent more than two thirds of this tax money on the maintenance and equipment of their troops” (Vries 2002, 92); John Richards claims that the regime took about one-third of the food grains and one-fifth of the cash crops (Richards 2003, 28). Although the revenue payment was variable, the demand on both the peasant and the *jagirdar* (one who holds a *jagir*) was uniformly high, and the need for more revenue was continuous. The emperor reserved the best lands in each province as his personal *jagirs*, which paid for the cost of the court, but in times of crisis the amount was often too little. As the Mughal Empire was in a constant state of warfare, the demand for new revenue estates was pressing; as new *mansabdars* were appointed, especially during times of military expansion, more *jagirs* were needed to hire more cavalry. As a consequence, *mansabdars* looked for new ways to raise the amount of revenue collected or to make it appear as though they were carrying all the horses and men required by their rank. In the first instance, the only solution to raising the revenue was to rack-rent the peasants. In the second case, *mansabdars* had to falsify their ledgers or use money set aside for their own livelihood. By the last decade of Akbar’s reign, unrest bubbled just below the surface.

In 1595, Akbar responded to the discontent by overhauling the entire system. He divided the *mansab* into two separate payments: *zat* and *suwar*. *Zat* became one’s personal salary, based on status and rank; *suwar* was the payment for the horses, men, and equipment. The two payments, in the form of *jagirs*, were

completely separated to the point that mansabdars could be assigned revenue estates in opposite regions of India.

This division was the first in a series of changes to the mansabdari system that were introduced by Akbar. The emperor rightly feared the potential of the nobility to take it upon themselves to form autonomous kingdoms. He also realized that a jagirdar's power over the peasant population in his jagir could be a catalyst for insurrection. Akbar foresaw an arrangement in which a jagirdar might lower the revenue demand on the cultivators in return for loyalty to him rather than a distant ruler. He also knew that the key to offsetting such an agreement was to distance the jagirdar from the jagir. Provisions for such a distancing had been in place since Sher Shah's time, if not earlier, in the form of a group of middlemen known as zamindars. "Zamin" is the Persian word for "land," and a zamindar was one who was associated with land. A zamindar was responsible for collecting the revenue due from his assigned jagir and arranging for its transference into money and subsequent delivery to the jagirdar; in return he received about 10 percent of the revenue he handled (Habib 1999, 182). Zamindars were usually upper-caste Hindus whose families were among regional elite. The Mughals hoped to further incorporate themselves into the mofussil (rural regions) by providing official government positions to the indigenous notables. Zamindaris were not moved, and their titles were hereditary. The zamindars became the linchpins of the system, and they play a crucial role in Indian politics and society even today, some 50 years after the practice of zamindari was abolished in independent India.

Akbar realized that the liaison most dangerous to continued Mughal rule was the one between the jagirdar and the zamindar. To discourage conspiracies, he initiated a series of checks and balances. Mansabdars swore their allegiance to the personage of Akbar rather than to the empire. Mansabdaris were given at the whim of the emperor, and they could be taken away by that same whim. The positions were not heritable. A series of controls meant to limit contact between zamindars and jagirdars was introduced. Jagirs, as well as being noncontiguous, were also placed a great distance from where the jagirdar was stationed. Jagirs were transferred every few years, so that no relationship between the two could develop over time. Jagirdars too were frequently moved from station to station.

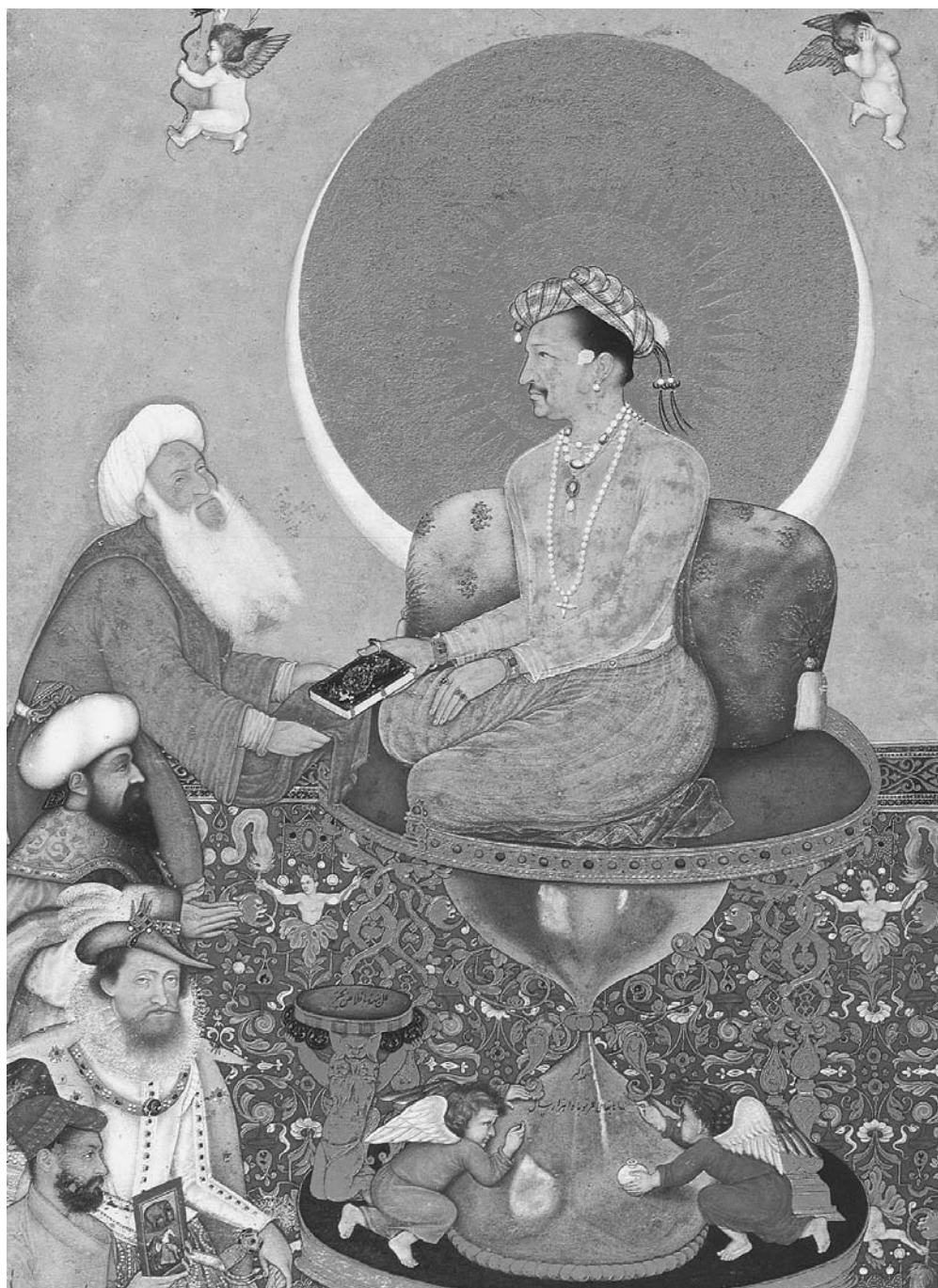
Although the system prospered during Akbar's reign, it had inherent flaws from the beginning. Because jagirs were not hereditary, jagirdars had little interest in the long-term health of the mansabdari system. Even so, as long as the model stayed lean, it provided, in general, a good life for those involved. Problems arose when revenue collection reached a breaking point. As shown in Chapter 4,

peasants will usually remain willing participants in a system that they perceive to be following the moral economy. Once the sense of justice disappears, as evidenced by the occurrence of famine or the rack-renting of the peasantry, the cultivators will look to other options. To satisfy all the participants in the revenue system, the number of mansabdars must remain stable or the amount of arable land must grow. As the system took in more and more mansabdars (from the reign of Akbar to that of his son Jahangir, the number of mansabdars rose from about 800 to 3,000), the empire was forced to find more sources of revenue, which meant cultivable land. This continuous demand precluded that the Mughal Empire remain in a constant state of war, and consequently brought about enormous changes in the environment in a relatively short period of time.

One sure sign of revenue scarcity was famine, which periodically swept across Mughal India. The worst famine in Mughal times covered North India from 1630 to 1632, stretching as far south as Surat. In West India the calamities reached biblical proportions; a drought was followed by massive flooding, which was in turn followed by a plague of locusts. In East India this period saw the Ganges and some of its tributaries change river beds, leading to small harvests for several years. The famine coincided with the assumption of the throne by Shah Jahan; he immediately began a massive campaign to open new areas up for cultivation.

As John Richards has emphasized in his environmental history of the early modern world, picking up from the seminal work of Richard Eaton (1993), East Bengal provides a perfect example of an environmental frontier. Contrary to popular perception, East Bengal (now Bangladesh) was not an early Muslim oasis in India. Indeed, were it not for the scripted strategy of revenue expansion in the 17th century, East Bengal as a Muslim homeland may never have been established.

Muslims did settle in Bengal in the early days of Islamic control of the Gangetic Plain, but they had no interest in socializing with the Bengalis. Known as the Ashrafs, these Muslims proudly proclaimed their Turkic lineage. Shortly after the invaders gained control of Delhi, Ashrafs moved into southern and western Bengal; the east, however, remained completely isolated. There are a few reasons for this. East Bengal in the 15th century had no tributaries of either the Ganges or Brahmaputra rivers, which were the connective tissues for trade and communication with the rest of North India. The region was also so deeply forested that it was impossible to grow enough crops to make a sizable profit, let alone ship them across South and Southeast Asia. Added to this was the fact that the inhabitants were forest dwellers, who were considered dangerous and polluting to caste Hindus (see Chapter 2). That the Ashrafs did not wish to convert the



Jahangir snubbing King James I of England, by Bichitr, earlier 1620s. (Bildarchiv Preussischer Kulturbesitz/Art Resource)

achut (untouchable) to Islam tells us a great deal about the assimilation of Muslims into Indian, or more specifically, Vedic culture (Eaton 2000, 249–275). With an attitude that would be copied by the British, the Turkic Muslims believed Bengal's climate led to enervation and depravity. Abu Fazl, Akbar's adviser and historian, epitomized this attitude. In words that would be echoed by the British two centuries later, he argued that "the country of Bengal is a land where, owing to the climate favoring the base, the dust of dissension is always rising. From the wickedness of men families have decayed, and dominions ruined" (Eaton 2000, 250–251).

In truth, during the first century or so of Mughal rule, East Bengal was best known for its diseases, wild mammals, and venomous reptiles. The jungles and swamplands were thought to be so dangerous that the district of Purnia, located in Subah Bengal, had a folk saying that, roughly translated, warned: "If you wish to die/Don't eat poison/Don't drink venom/Simply go to Purnia" (Hill 1997, 19). The Sunderbans, in the southernmost section of East Bengal, is today the last refuge for the Bengal tiger; in the Mughal era these animals were a true menace to life and property. As a result, cultivation was minimal in this region.

By the beginning of the 16th century, however, the ecology of Bengal began to change. Through a process of massive siltation (which will be explained in detail in Case Study B) the Ganges began to switch river beds, moving eastward until it eventually joined the Brahmaputra River south of the Bangladeshi capital city of Dhaka. This movement also led to a process of siltation in the east, caused by the massive deposits that the Ganges left in its wake as it changed courses. By the early 17th century, East Bengal's environment had become perfect for wet-rice cultivation, and the Mughal administration began to take notice. East Bengal had now become eminently cultivable and taxable, provided it was cleared of its dense forests and marshlands (Eaton 2000, 259–260).

Given the value of the land, the emperor formed an auxiliary unit of craftsmen and cultivators to accompany his advancing military forces into Bengal. A Mughal document described the process: "From the time of Shah Jahan it was customary that wood-cutters and ploughmen used to accompany his troops, so that forests may be cleared and land cultivated. Ploughs used to be donated by the government. . . ." (Richards 2003, 33; Eaton 1993, 228). Once the lands were cleared enough for preliminary cultivation, the empire turned to Sufis to supply migrant cultivators. The administration offered a number of incentives for moving: tax-free church lands were liberally donated to the Sufi sheikhs (holy men); moratoriums on revenue were granted for the first years of start-up; and when leases were signed, they were for short periods, so that the quality of the land and crops could be established. The Mughals also promised protection along the frontier; this was particularly important given the number of pirates, ranging

from the Portuguese to the Arrakans (from Burma), who took refuge in the Sunderbans. To this end, they eventually drove the bandits out, annexing the city of Chatgaon in 1666. Chittagong, as it is known today, became a major port for the Mughals, and it is now the primary commercial center for the country of Bangladesh.

For their part, the sheikhs used their charisma and religious authority to persuade large numbers of families to move to Bengal, clear the last of the jungle, and incorporate themselves into the Mughal mansabdari system. They were also very successful in converting the forest dwellers, who had little attachment to Hinduism, to a unique Bengali form of Islam. The results changed the land and the people; indeed, it is not an exaggeration to suggest that the social composition of 20th-century and contemporary Bengal (and thus the ingredients for the independence movement) can be traced back to the mansabdari system. As Eaton has aptly noted, environmental change led to "a remarkable congruence between a socioeconomic system geared to the production of wet rice and a religious ideology that conferred special meaning on agrarian life" (Eaton 2000, 275).

Although East Bengal provided a new source of sustenance, by the time of the emperor Shah Jahan famine had increased markedly. The famine of 1630–1632 was most destructive in Gujarat and the Deccan. Irfan Habib describes scenes of utter horror; the population resorted to eating unclean or sacred animals, and instances of cannibalism were recorded. The famine was exacerbated by constant warfare; what grains there were went to feed Shah Jahan's army and not the peasantry. In Gujarat alone, 3 million people died in the first 10 months of 1631 (Habib 1999, 115–117).

As in the east, a concentrated effort was put forth to clear more forest lands (known as *bankatai*). A broker's mere promise to arrange to clear forests and settle the land with cultivators was usually enough to gain him a zamindari right to the land, sight unseen. The emperor also expanded eligibility for *madad-i-ma'ash* (aid for subsistence). These grants of revenue-free land were usually set aside for religious mendicants and scholars, but during the famine they were given out to the needy as well.

One of the changes that accompanied the opening of newly cultivable land was the government's request that the peasants introduce cash crops into the economy. Particularly in Bengal, the expansion of cultivable land had an ancillary effect. Once the famine came to an end, an abundance of inexpensive food allowed the cultivators and their families to branch out into other moneymaking industries, especially that of cloth production. Niccolao Manucci, a Venetian traveler who spent most of his life in India, noticed the demand for cash crops during his year spent in Dhaka. Manucci claimed that all Mughal exports were derived from four plants: the cotton plant; the indigo plant, which produced the

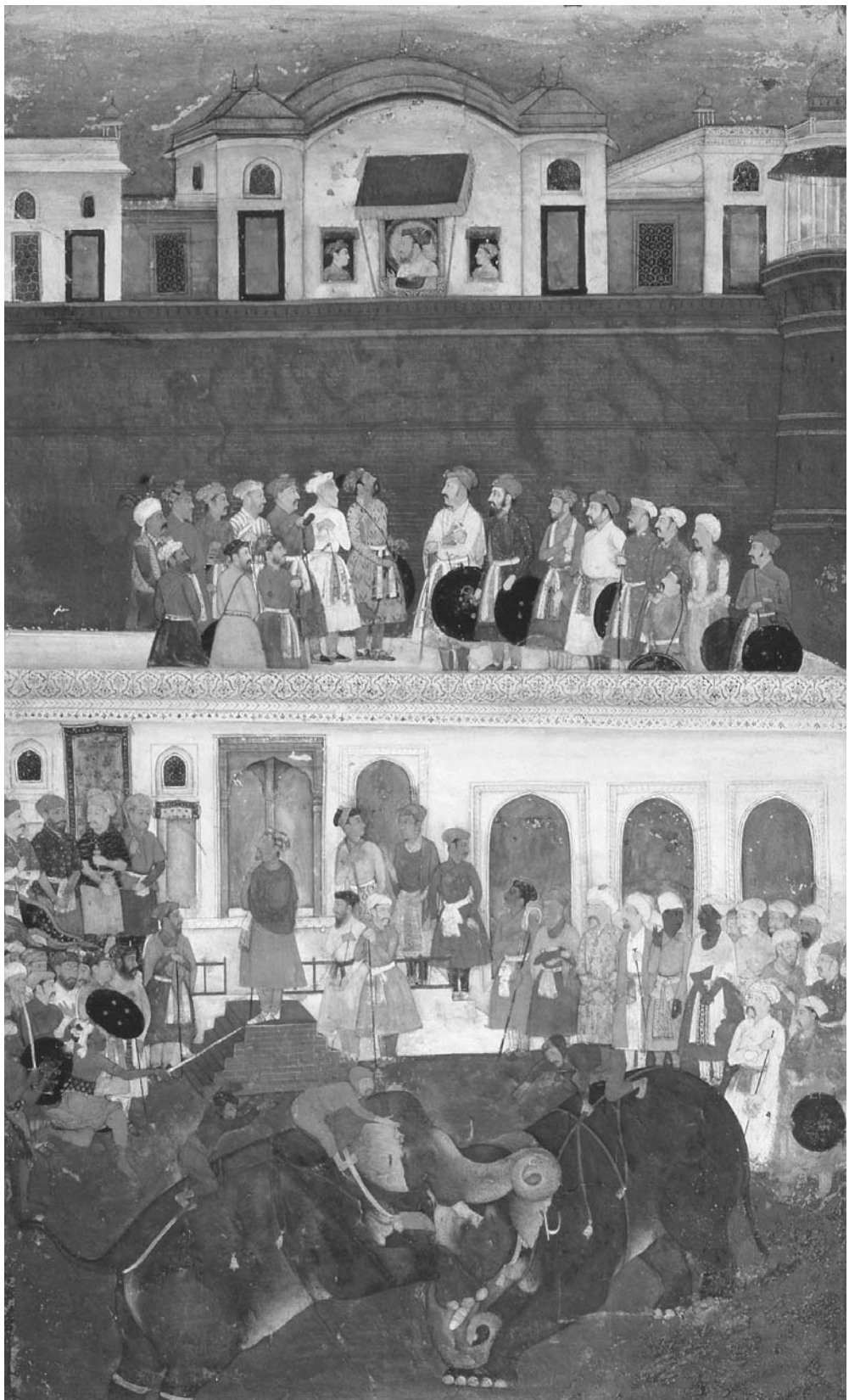
essential ingredient for dye; the opium plant; and the mulberry bush, from which silkworms spin their silk (C. Singh 1995, 35). When we combine the demand for these products with the demand that revenue be paid in coin, we can see that the Mughals were increasingly a part of the burgeoning capitalist world economy.

The Decline of the Mughal Agrarian System

The decline of the Mughal Empire was reviewed in Chapter 5, but we also need to focus on the mansabdari system as a window into the transformation of the perceived value of nature. The rise in demand for cash crops was a symptom of the emergence of a global imperialism whose legitimacy was based on a supreme belief in the power of free trade. Other changes within the mansabdari system are also indicative of the evolution of the Indian economy from that of a dynamic agrarian state to a captive market for cheap finished goods from Great Britain in two short centuries.

One of the primary causes for the decline of the mansabdari system (and, really, the empire as a whole) was that it worked too well. As we noted at the beginning of this case study, the existence of a system of administrative, military, and revenue governance that lasted for 150 years in a large empire with poor communications is remarkable in and of itself. The reasons for its rise are also the reasons for its decline. A closer look at the reign of Shah Jahan reveals the problems that eventually led the empire to implode.

Shah Jahan's empire represented the height of luxury and opulence. Married to Mumtaz Mahal, a woman whom he deeply loved, he constantly showered her with riches to represent his passion. Shah Jahan had a great interest in architecture, and he personally had the old city of Delhi rebuilt and renamed Shahjahanabad. In its center was the Red Fort, the emperor's residence. Inside, the emperor sat on the great Peacock Throne, six feet high, made of silver and gold, and encrusted with jewels. (In 1739 the Persian emperor Nadir Shah raided Delhi and took the Persian Throne back to Iran, where it became the symbol of the greatness of Persia, both ancient and contemporary.) Upon the wall of the *Diwan-i-Khas* (the Hall of Private Audiences) it was written in ornate Persian script, "If there be a Paradise on earth, it is here, it is here!" In 1631, while giving birth to her 14th child, Mumtaz Mahal died at the age of 39. Shah Jahan, who was crushed, determined that he would build for her the greatest mausoleum of all time. The Taj Mahal, as it became known, was built in the city of Agra, overlooking the Jamuna River. It took 20,000 workers more than 17 years to complete. Architects and workers were imported from West Asia and Europe. It is



Shah Jahan at the Red Fort in Agra. (Werner Forman/Art Resource)

estimated that its cost in contemporary currency ran into the hundreds of millions of dollars.

Clearly, this pattern of extravagance had its cost. To pay for his lifestyle Shah Jahan had to raise the revenue demand as high as he possibly could. Although he did not raise the number of mansabdars, he did raise the ranking. Under Akbar, the highest ranking one could have was 10,000. Shah Jahan gave himself a mansab of 30,000, rewarding his favorite son with a rank of 60,000. As a result, the emperor desperately needed to add new jagirs to the empire. Although he had success in Bengal, and partial success in conquering kingdoms in the Deccan, his campaigns in the west were disastrous. Three times he tried to defeat the Safavids in Persia, and three times he failed. As a result, he was unable to expand enough to satisfy the demands of the mansabdars. As the demands for revenue grew, the elite began pressuring the peasantry for a larger share of the revenue. The effect of this on the land was great, because peasants were forced to overcrop and to use forests for commercial crops. They could not leave any lands fallow, if they were to pay the demands of the zamindars and jagirdars. In short, there was friction at every level of the agrarian hierarchy.

The mansabdars increasingly had no vested interest in the system. They could not pass their jagirs down to their sons as an inherited right. Increasingly, their jagirs were being transferred every two or three years. The more powerful of them were stationed in areas that were already linguistically (Bengal), religiously (Hyderabad), or administratively (Awadh) autonomous. When central power was weak, it was simply too tempting to declare autonomy from the central administration. Although these states rarely broke away from the Mughal Empire in any official sense, they paid little more than lip service to the Mughal emperor.

The zamindars too took advantage of the discontent. They were in a special position of power, because they were local, respected figures whose families had been mofussil aristocrats and whose positions had been passed down through several generations. A discontented peasantry would often rally around a sympathetic zamindar who seemingly shared in their outrage over living below the margin of scarcity. When all three of these forces came together, a jagirdar could make a settlement with the local zamindars and peasantry, promising the former a higher percentage of the revenue while promising the latter a lower demand. States began declaring their autonomy en masse. So expansive was this movement that by the time of Shah Alam II (1759–1806), a popular saying noted that “From Delhi to Palam is the realm of Shah Alam.” Palam was a suburb of Delhi.

Conclusion

The Mughal agrarian system had a permanent impact on the land and society of late medieval India. The results can be seen in Bengal today. Millions of Muslim peasants flocked to East Bengal with the assurance that their sacrifices would provide them with a better and more peaceful lifestyle. As the chapters on the East India Company's flawed interpretation of the mansabdari system have shown, by the beginning of the 19th century the peasants were virtually tenants-at-will, subject to the demands of their mostly Hindu landlords, who previously had simply been revenue collectors. As the demand for a separate Muslim state in South Asia began in the early 20th century, these peasants became willing participants in a movement that they hoped would free them from the shackles of their zamindars.

Still another permanent effect was the massive deforestation that accompanied the search for new jagirs. As the Mughals expanded their empire, they did so with a determination to conquer nature as well as South Asia's human inhabitants. Vast regions of wilderness (tellingly labeled "wasteland" by both the Mughals and the British) were destroyed to make way for cultivation. Increasingly, the jungles were replaced by cash crops—cotton, opium, indigo, and silk—that were not only highly marketable but, ironically, were also the commodities that along with spices originally drew the Europeans to Asia. Increasingly, nature and its bounties became commodities to the precolonial rulers, valuable only in terms of how much coinage they could bring.

Perhaps the most important legacy of the Mughal agrarian system, however, was the prototype of a commercial revenue enterprise that the East India Company would modify and expand, eventually establishing South Asia as its proprietary source for raw materials. All the commodities that the Mughals found valuable were incorporated into a "free market" that was largely free for the colonists, but quite expensive for the indigenous population. This "drain of wealth," as it became known throughout 19th-century India, would become the rallying cry for a nascent independence movement and its organizing body, the Indian National Congress.

CASE STUDY B: THE PERMANENT SETTLEMENT ACT AND THE KOSI RIVER

In 1786, five years after his defeat at the Battle of Yorktown, Lord Charles Cornwallis was appointed the second governor-general of India, with express orders

to establish a commercial empire in South Asia that would not only replace but would improve on the one lost when the United States won independence. Cornwallis arrived in India every bit the classic English gentleman farmer. He was a strong believer in absolute free trade, which meant no levies or taxes were to be charged to the East India Company. As befit his class, he was also a confirmed physiocrat, believing the key to public revenue lay in the concept of private property. Finally, Cornwallis was Eurocentric to the bone. He had no qualms that the English agrarian system was the ideal system for India, and he was convinced that everything European, when introduced to India, would be an improvement over the despotic situation that the pitiable subcontinent had faced for millennia. In short, he was the antithesis of an Orientalist like his predecessor Warren Hastings.

As such, instead of studying India's history of land and revenue, Cornwallis referred to the changes that had taken place in Britain in the past century or so. As briefly mentioned in Chapter 5, these changes included a transformation from the feudal system of lords, serfs, and commons (shared grazing land) to one of large landlords, landless laborers, and private fields blocked off by rows of hedges. As Cornwallis looked at the problems he found with the Company's revenue collection in the late 18th century, such as famine, corruption, and near bankruptcy, he decided that the solution lay in the complete overhaul of the agrarian system.

The governor-general's primary goal was to ensure that the Company had a constant, guaranteed annual revenue so that budgets, in terms of income and expenditures, could be figured on an annual basis and there would be no unexpected fluctuations in revenue. To ensure such revenue, Cornwallis believed the agrarian hierarchy had to be completely reordered. To this end, he looked at the Mughal system and, being totally ignorant of its nuances, changed its workings to one based on physiocracy. As Eric Stokes has argued, "the British mind found incomprehensible a society based on unwritten custom and on government by personal discretion" (Stokes 1959, 82). Cornwallis was no exception. Looking at the indigenous system, he decided the essential problem was the fact that the emperor owned all the land. Although this was technically the case, there were unwritten assurances at every level of the hierarchy that in return for loyalty the participants would receive their allotted portions of the revenue. It is also important to remember that under the mansabdari system, zamindars were local elites whose right it was to collect the revenue; they were middlemen rather than lords of the land. None of this was visible to Cornwallis, who insisted on a system of rules in which private property was clearly delineated. Physiocracy required, as Stokes further noted, that "revenue demands . . . be fixed, and that the remaining produce of the soil recognized as private property in the full legal sense" (Stokes 1959, 82).

The governor-general's philosophy became incorporated in the Bengal Permanent Settlement Act of 1793. So important is it to the next century of the environmental history of India, that it deserves to be quoted at length:

The Governor General in Council accordingly declares to the zamindars . . . and other actual proprietors of the land, with or on behalf of whom a settlement has been concluded under the Regulations above-mentioned, that at the expiration of the terms of the settlement, no alteration will be made in the assessment which they have respectively engaged to pay, but that they and their heirs and lawful successors, will be allowed to hold their estates at such assessments forever. (Hill 1997, p. 30)

The implications of this simple paragraph were breathtaking. With a stroke of the pen, the agrarian world was turned upside down. The law made the former revenue collectors, the zamindars, into British-style landlords, and the vast territories from which they collected revenue were now their private estates. Throughout the Bengal Presidency, survey and settlement officers were sent across the mofussil, surveying the land, figuring the quality of the crops traditionally grown in the region, and settling the revenue owed the company by each estate. Once the settlement was agreed upon, it was fixed in perpetuity; it could never be raised or lowered. The ramifications of this aspect alone were monumental, for it took into account neither natural disasters nor inflation. Thus, early on, many of the rural landlords could not pay their fixed revenues if the rains did not come or if the floods ruined the crops. Their lands were then auctioned for failure to pay the revenue, usually going to one of the increasingly small group of wealthy absentee zamindars, many of whom lived in Calcutta. This group of landlords became increasingly wealthy as inflation made their fixed revenue payment of less and less value. The final and most devastating blow came to the peasants, for whom no rights were enumerated in the Permanent Settlement. It was not until the passage of the Bengal Tenancy Act of 1885 that the cultivator gained some rights of occupancy to the land he cultivated.

The privatization of property had other ramifications. Gone was the flexibility of the moral economy model described in Chapter 4. As the population of the Bengal Presidency grew, more and more cultivators were competing for the same land. Because they had no residency rights to the land, they could easily be replaced by those who were willing to work for a smaller percentage of the crop. Rack-renting of the peasantry increased at a rapid rate, with zamindars forming their own armies of *lathials*, thugs who armed themselves with lathis, which were bamboo poles that often had balls of molten lead attached to their tips. As a result, peasant rebellions were common occurrences throughout British rule.



Diara land along the Ganges River near Patna. (Courtesy Christopher Hill)

Finally, the most fundamental problem was the essential environmental Eurocentrism of the act. The Permanent Settlement was based on Cornwallis's conception of nature, which was formed by his knowledge of both sides of the Atlantic. In Britain and on the Atlantic coast of America, rainfall was moderate; England (with the exception of the Lake District), averaged between 20 and 40 inches of rain per year. Furthermore, rivers on both sides of the ocean emerged from ancient mountains whose slopes were relatively gradual. As a result, the rivers with which Cornwallis was familiar were relatively gentle, meandering to the ocean or the North Sea.

North Indian rivers existed in a completely different environment. The Bengal Presidency was, and is, the location of two of the greatest river systems in the world: the Ganges and the Brahmaputra. These river systems, containing dozens of tributaries, exist in an environment that can easily produce more than 100 inches of rain in one season. Many of these rivers flow directly from the Himalayas, rushing into the Gangetic Plain, all the while carrying massive amounts of silt, and sometimes sand, from these young mountains to fertilize the South Asian breadbasket. In addition to silt, however, these rivers can also bring devastating floods, and crucial to our purposes, they often change their beds. Thus, from year to year many of these rivers can cover some of the most

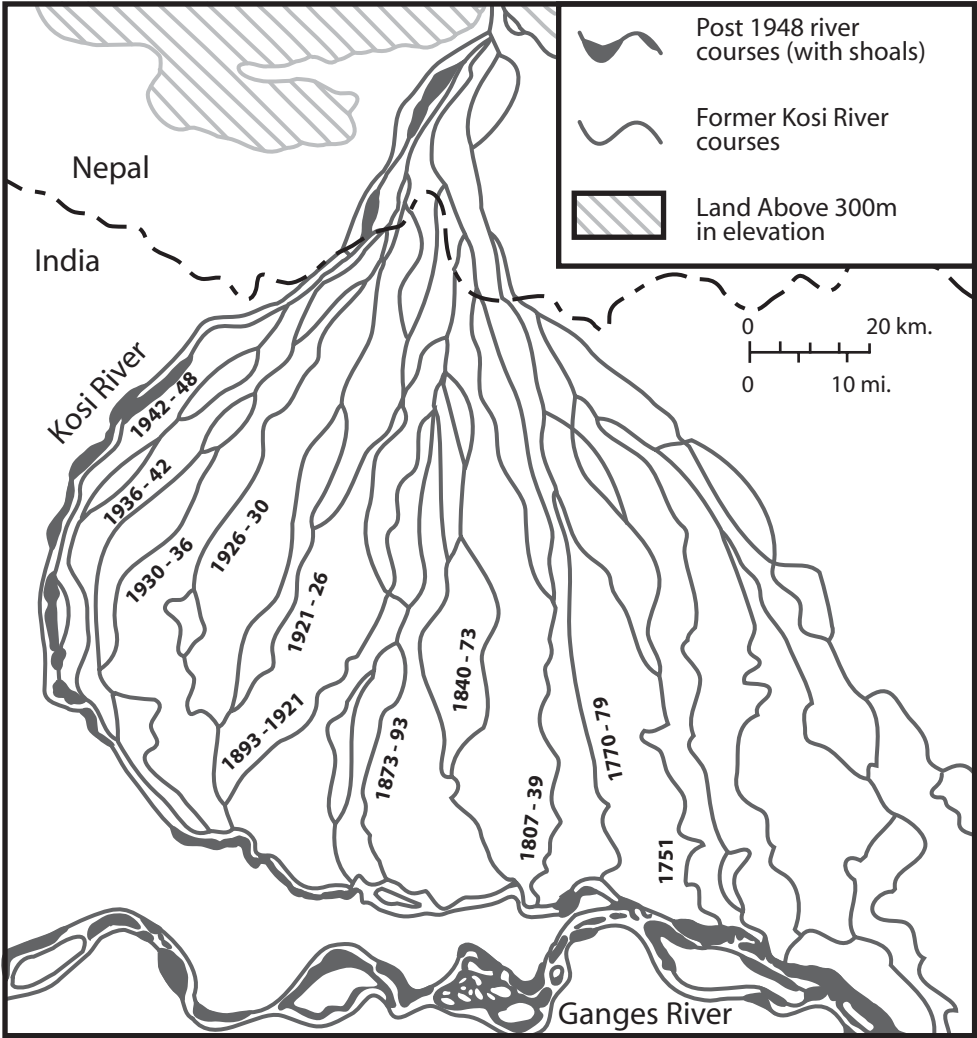
fertile land with sand, at the same time drowning other lands for years when changing their beds (Hill 1997, chapter 1).

None of this occurred to Cornwallis and his advisers when working out the details of the Permanent Settlement. The main question left unanswered was this: How can a riparian region, in which rivers are constantly changing course, be surveyed and settled? Land that had been settled for a specific revenue rate could find itself under water five years later; similarly, land that had been a river-bed at the time of the settlement could be valuable, fertile cultivating material five years hence. Both possibilities, however, were imprisoned by the absolutes of the Permanent Settlement. The issue of how to tax both peasants and zamindars in these riparian regions would haunt the British until the end of empire. No river exemplifies this paradox better than the Kosi.

The Kosi River

The Kosi River rises out of the Himalayas in Nepal and, until it was embanked in the 1950s, laid a violent path across North Bihar as it rushed toward its con-junct with the Ganges River. The Kosi was the catchment for the floods of 24,000 square miles of mountain basin, including Mount Everest; the catchment was greater than any North India rivers except the Indus and Brahmaputra. Because the river is only 800 miles long, its flow of sand, carried from the mountains in Nepal, was enormous, and its velocity was explosive. By the time it reached the district of Purnia in North Bihar, the river roared through the last half of its journey, carrying thousands of tons of sandy material and destroying the surrounding countryside. The indigo planter James Inglis described the area in 1875 in these terms: "Miles of rich land, once clothed in luxuriant crops of rice, indigo, and waving grain, are now barren reaches of burning sand. . . . It was a scene of utter waste and desolation" (Inglis 1878, 340–342).

The cause for such devastation was the sand that the river deposited on the banks during its volatile journey to the Ganges. With slowly meandering rivers, heavier particles of sand are usually swept away at the higher regions, where the river's rapids are extreme, and the lighter silt is normally carried to the delta, making those regions particularly fertile. The Kosi was a completely different type of river; it was known to rise 30 feet in a 24-hour period. As such, the sand was carried into the plains where, as noted briefly in Chapter 1, it once covered the smokestacks of an indigo factory. Furthermore, at times it was so engorged with sand and silt that it overflowed its bed, causing it to search for a new one. From 1736 to 1950 the river moved more than 70 miles to the west (S. C. Singh 1973, 66–72).



Westward movement of the Kosi River in Bihar. (Schwartzberg, J. E. ed., A Historical Atlas of Southeast Asia, Chicago University Press, 1978)

The material that the river left in its wake as it traversed Purnia, as well as the land bordering the new beds, was known as *diara*, or “fluctuating river tract.” In many cases *diara* is a fertile addition to the land, but the Kosi could leave the land sandy and desolate for almost half a century. *Diara* can also be very temporary, for as the river shifts, so too does the alluvial soil. As such, land that might be cultivable one year might be under tons of sand the next year. Similarly, land that had been a riverbed previously could now be newly open for cultivation. To further complicate the situation, the Kosi *diara* might only become cultivable after a half century. The process usually proceeded in the following manner: The

desertified land would gradually produce small plants, which would slowly fertilize the soil and eventually lead to the growth of jungles (the Kosi region was one of the most popular tiger-hunting spots of the late 19th century). Finally, peasants would be brought in to clear the land and recultivate it.

The Permanent Settlement in Action

From the moment of the signing of the Permanent Settlement Act, the government was faced with a unique quandary: How could they settle the revenue on land that one year could be eminently cultivable but the next be a new riverbed? The colonial government began looking for solutions within the year, using sepoys who had been wounded in battle as their guinea pigs. As part of their retirement wages, invalids were given jagirs (in this case patches of wasteland), with the expectation that they would bring this land under cultivation. Given the intense labor required to clear the wilderness, and the fluctuating nature of the riparian land, few of these small landholders were successful. Within a decade the government admitted that such a project was hopeless. As with other estates, the jagirs were auctioned, and the wealthy zamindars in Calcutta and elsewhere bought the plots. By the middle of the 19th century, the three largest estates, which covered most of Purnia, were owned by absentee zamindars, who were content to sit on the land until it became fertile.

By the 1820s, the government was at a dead end. Revenue worth hundreds of thousands rupees was going uncollected because the zamindars were allowed to declare their *diara* as wasteland. The issue of wasteland particularly infuriated the Company. In administrative parlance, wasteland was literally land that was going to waste because it was not producing revenue. The term not only meant desert, or jungle; it also meant, for example, sacred fruit groves, in which the fruit was allowed to ripen and fall from the trees as an offering to a deity. They were particularly incensed, however, by land not allotted to any zamindar but that was clearly producing revenue for one or more. The most obvious examples of this were the shifting lands near rivers. In 1825, the government formally addressed the issue for the first time. Under the terms of the Bengal Alluvion and Diluvion Regulation, alluvial land "shall be considered an increment to the tenure of the person to whose land it is thus annexed" and could now be assessed for revenue (Hill 1990, 10).

The 1825 act caused immediate problems and serious contention, and an untold number of zamindars filed lawsuits over the next few years. Settlement officers were spread across the country, estimating exactly which land had been added and what the revenue for those lands should be. In the case of the Kosi

region, the revenue settlement was usually based on that of the adjoining lands, even though the added Kosi *diara* was often unfit for any cultivation whatsoever. To make matters worse, there was no stipulation for a remission in revenue for those lands that had become diluviated—that is, those under the river. The settlement officers as a group saw the attempt to bring these lands under the rules of the Permanent Settlement as such a fiasco that they urged the complete dissolution of the *diara* settlement, arguing that “we think it impossible to lay down any fixed laws for a shifting sand, and the method of carrying it out must always remain precarious and uncertain” (Hill 1990, 11).

The government, however, was not willing to declare the riparian regions wastelands. Still another Bengal Alluvion and Diluvion Act was introduced in 1847. This act did allow for an abatement on revenue for land under the river. But the act went further; it stated that landlords could not pay the revenue payment on lost land even if they wished. As innocuous as this might seem, this ruling caused so much contention that it led to a case that was appealed all the way to the Privy Council in London. For by not being allowed to pay revenue on the temporarily lost land, a zamindar lost all rights to the land. When the land came out of the river, it was either considered the new property of the estate it abutted or it was put up for auction. The court in London overruled the government, ruling that a zamindar could continue to pay the revenue for the land, and thus was able to keep it listed as his property, though clearly at a cost.

The government finally admitted defeat in 1896, when the Board of Revenue reached a compromise of sorts. Those *diara* lands that were not thought to be “of a fluctuating nature” were to be settled under the provisions of the Permanent Settlement. In the Kosi region, however, because of the unstable *diara*, no settlements were to be made, and no records of ownership or proprietary rights were formally established. This system was in place until the end of the colonial period.

The Peasant and Riparian Cultivation

We have seen how the zamindars (and their intermediaries, who managed the estates for the absentee landlords) reacted to the changing environment; they usually responded with litigation or, when that failed, by rack-renting the peasantry to pay the revenue on nonproductive land without lowering their profits. For the peasant on the land, the situation was much more tenuous, for, given the notorious instability of the Kosi, it was impossible to foresee whether one would have a bountiful harvest the following season or an empty, flooded field.

To accommodate the problems of the shifting river system, the peasants and the landlords' agents had done something Cornwallis never would have comprehended. Using their local knowledge, the cultivating classes had agreed to an innovative tenurial system that accounted for the changes in the land. The system had three evolving components, known as *jotjama*, *halhasila*, and *birawari*. The first stage, *jotjama*, became the tenure system when the land was first being reclaimed from the Kosi. This tenure was specifically designed to entice peasants to reclaim the land. There were no property demarcations and no records of rights or obligations. Peasants were simply encouraged to take the fallow land and attempt to cultivate whatever crops they wished. Rates and localities changed from year to year depending on annual fluctuations, and the raiyat (as the Bengal peasant was known) could give up his lease any time he chose to do so. By the latter part of the 19th century, migrants from across Bihar (including adivasis from the Santal Parganas) had been persuaded to attempt to recultivate the Kosi region under such flexible terms.

As the river moved farther westward, and over time portions of the *diara* became increasingly fertile, the *halhasila* tenure was introduced. This tenure began to look more like the typical Permanent Settlement arrangement, with the stipulated land being measured, and leases being given to the raiyats by the zamindars for definite periods of time, usually five years. Rent rates were flexible, however, in that the revenue was charged according to the value of each specific crop grown each harvest season. For example, in 1875, melons and cucumbers were valued at 2–8 rupees per bigha (about three-quarters of an acre), while the rate for indigo was 1 rupee per bigha (Hill 1997, 115–116). Although more defined, this system had some elasticity, allowing for different crops to be grown according to the capabilities of the particular plot. Furthermore, because revenue was estimated only on crops actually produced, the raiyat was not obligated to pay taxes on nonproductive land. Indeed, the tenant was not required to grow any crops at all, as long as he did not rent his fallow land to another raiyat.

Birawari resulted from cleverness on the part of the peasantry. The cultivators would anticipate the arrival of the settlement office and purposely leave most of their land fallow. Once the measurement was taken and the officer had departed, the raiyats would begin cultivating the areas they had claimed to be fallow. To counter this, landlords began charging a fee for uncultivated land; this became known as the *birawari* system.

The system, based on local knowledge, worked much better than any attempt based on the Permanent Settlement. The manager of the largest estate along the Kosi noted its usefulness: "The reason is not far to seek. The river Kosi after covering vast tracts of land with sand . . . goes off in some other direction, and in the course of years this land again becomes fit for cultivation . . . [and] it is

necessary to assess low rates to attract cultivators. As the land is reclaimed from the jungle and cultivation advances, the villages adopt the [halhasila] system" (Hill 1987, 1451–1452).

The system was by no means idyllic. Landlords and managers still had many ways of rack-renting these *diara* peasants. Because intermediaries were required to remeasure the land every year, they often took advantage by using shorter measuring sticks the following year, thus claiming that the size of the tenancy had grown. The informality of the system also allowed unscrupulous landlords to raise the revenue demand at will. A particularly insidious practice developed in light of the Bengal Tenancy Act of 1885, which gave raiyats occupancy rights to the land, providing they could produce rent receipts to prove they had cultivated the same plot for 12 consecutive years. Zamindars went to court claiming that, given the fluctuating nature of the Kosi, no raiyat could claim to have cultivated a precise tenure for 12 consecutive years. When the landlords won these cases, as they mostly did, the cultivators became landless laborers, with no rights in the land at all.

Still, cooperation between those who lived on the spot, with the knowledge of the local terrain having been ingrained from generation to generation, provided a workable, if not always satisfactory, solution that the colonial administration would never have imagined. One final example of the problems encountered by the Company's (and after 1858, the crown's) use of Eurocentric methods in a South Asian environment came in the administration's attempt to use the Kosi *diara* region as a laboratory to test a colonial famine policy that was based in part on the policies implemented during the Great Irish Potato Famine of 1845–1850.

The director of government relief in Ireland had been Charles Trevelyan, who had spent his early career in Calcutta and would go on to become governor of Madras. Trevelyan had a firm belief in laissez-faire economics, which played a crucial role in many of the famines in British South Asia. Although John Russell, prime minister of the last Whig government in English history, only paid for the passages of some 5,000 paupers to North America, his administration was given credit by many for the other 2 million people who migrated to Canada and the United States. Indeed, in the middle of yet another famine 25 years later, the Government of India willingly latched onto it, noting that "if the idea of emigration could be popularised, so as to take hold of people as it did twenty-five years ago, it would be the best thing to happen" (Hill 1997, 137). And so the Government of Bengal, led by the incompetent Richard Temple, set off on a plan to move a population from south of the Ganges into the jungle and disease-infested regions of the Kosi *diara*, as a tool to mitigate famine. However well-meaning the famine officials may have been, the adivasis who did migrate to this area,

the Santal people, have since led bleak lives in North Bihar. A recurring disinterest in the distinct environment of the Kosi, on the part of the colonial bureaucrats, changed the environment and the livelihood of the Santals with tragic consequences for both the local landscape and the population.

The Santals and the Kosi Jungles

The Santals were (and are) a group of adivasis, or tribals, who settled in hilly regions south of the Ganges well before colonial rule. The term “tribal” is one we must use with caution, for it carries with it a colonial identity that many find demeaning. Adivasis are sometimes referred to as indigenous peoples (as opposed to foreign peoples who moved into the area). That definition does not really do justice to the adivasis in India, for it gets tied into the religious-political debate concerning which South Asians are indigenous. As far as the Santals are concerned, the important social characteristic for this study is that they are not Hindus and that by the 19th century they had earned a reputation as hard-working clearers of forests.

The Santals had also been separated from the emerging world market of free trade into which the British were sucking India. Given the colonial attitude toward nomadic peoples (see Chapter 7), the colonial government encouraged the Santals to migrate throughout Bihar and Bengal, turn forests into cultivable land, and settle on that land. In a period of 12 years (1839–1851) 80,000 Santals moved into and cleared the area now known as the Santal Parganas (the Santal District). As is common in many tribal groups, the Santals moved as a community; each group was led by a headman who negotiated contracts for clearing the land. The Santals soon fell prey to those who understood the new *laissez-faire* principles, and in a short time they lost their lands to moneylenders and local landlords. In 1855 they rebelled against the government. The 30,000 Santals with their bows were no match for the 14,000 troops armed with rifles. More than 10,000 Santals were massacred (Ran. Guha, 1983).

As a reaction to the appalling loss of Santal lives, the government enacted the Santal Land Alienation Regulation, so that the Santals were protected from foreclosure even if they were in debt to moneylenders and zamindars. Only the district commissioner, the government administrator of the Santals, could approve eviction of the adivasis from their land. Yet Santals who resided in districts other than the Santal Parganas were not protected from eviction.

Famine struck North Bihar once again from 1873 to 1874, allowing Temple to put his plan into action. Santals were imported into the jungles left in the wake of the movement of the Kosi to begin clearing the land and opening new

areas for production. As usual, they migrated in communities, with the headman, or *pattadar*, signing the contracts, known as *pattas*. Because the *pattadar* alone signed the contract, only he had any legal rights to the *diara* and cleared jungle. This meant that unscrupulous headmen could sell the contract and then flee, leaving the rest of the community with no security; this happened often. For various other reasons as well, contracts were abrogated or lost, leaving the Santals as nothing more than landless laborers. The new owners, who still needed Santal labor, and who also knew that the Santals were in a weak negotiating position, set them up as sharecroppers, theoretically for 50 percent of the crops. However, the landowner would advance the sharecroppers land for a hut and small garden, as well as rice to feed his family, until the crop came in. These were advanced at usurious interest rates. As the Kosi *diara* inspector noted in 1927, “these advances with fifty percent interest are taken back from his half share of the produce and there is nothing left” (Hill 1997, 148). The Santals ended up further in debt each year. If they refused to agree to sharecropping, they were evicted from the land. Because they were not protected by the Santal Land Alienation Regulation, they were one of the only groups left who, having no occupancy rights, could be freely evicted if they did not agree to rack-renting.

The Santals responded with litigation, but powerful landlord groups, with their European connections and their lathials, were able to coerce the suits into being dropped or use their influence to make certain the cases were never heard. By the 1930s the Santals had exhausted all legal means available to them. They turned, then, to insurrection. In early 1940 the Santals, having cut their crop, refused to divide it with the landlords until they received rent receipts. They then began forcibly cutting the personal crop of the zamindars. When the zamindars sent their lathials in, the Santals responded with their bows and arrows. Only after the arrival of a large police contingent and the arrest of 35 Santals did the crowd disperse. Throughout 1940, however, more than 80 villages and 100,000 acres were involved in Santal insurgency.

Conclusion

India gained its independence in 1947, and the zamindari class in Bihar was legally abolished in 1951. Under the legislation, the land was to pass to the tiller. In Purnia and throughout most of Bihar, this agrarian revolution never came close to being carried out. Land either passed into the hands of the zamindars’ agents and middlemen who were listed as cultivators (because the Santals had no rights in the land), or they stayed in the hands of the landlords. Through a process

known as *benami*, the large landlords would give parcels of land as gifts to their relatives. Because possession of irrigated land was limited to 20 acres, hundreds of parcels would be gifted to their most distant relatives. In reality, of course, the land never changed hands. Decades after Indian independence, armies of *lathials* still roamed Bihar, oppressing the sharecropping Santals. The most notorious case occurred in 1971, when an army of 150 *lathials* attacked a group of Santal sharecroppers in their field. They drove them back to their houses, which the *lathials* then set on fire. By the time the fires were put out, 14 Santals were dead.

As for the Kosi, it continues to change its course and to cause devastating floods into the 21st century (see Chapter 8 for more on this). Talks between Nepal and India about means of controlling the river have continued for half a century. India wishes to build a high dam north of the Chatra Gorge in Nepal, but Nepali environmental activists and some Nepali engineers are worried about the project's effect on the environment and are skeptical about its ability to tame the Kosi and provide vast amounts of irrigated water, as it promises to do. There the matter rests.

The results of the British policy of ecological Eurocentrism had a profound effect on the ecology and the peasantry of North Bihar. The Permanent Settlement Act was flawed from its inception. Based on an environment that over the centuries had seen little change in its river basins, the policy proved to be a disaster in North India. However, the effect of the Permanent Settlement went further than that. It established a class of landlords who, as long as they paid the revenue, answered to nobody for their deeds.

An ecological arrogance permeated colonial policy, based on an assumption that European science was so superior to any science studied in Asia that Indian scientists and engineers could have little or no role in its implementation. Indeed, as noted in Chapter 6, Cornwallis made this attitude explicit by banning the admittance of any South Asians into the covenanted ranks of the Indian Civil Service. In this equation, local knowledge had little value as well. Unless engineers were trained at the centers of scientific learning in London and other European capitals, their abilities and ingenuity were ignored. Even British engineers trained at colleges in India that were built and run by the government were given lower-tier positions than newly trained engineers fresh from England.

The legacy of the Permanent Settlement can be seen in caste and class warfare in independent India, for land ownership is still tied up with issues of power and control, many of which find their genesis in the formation of the zamindari class. Most well-known is the Naxalite movement, which takes its name from Naxalbari District in Bengal, where in 1967 cultivators forcibly

reclaimed land and crops from the land controllers and started a violent movement that has swept across portions of East India. Perhaps not surprisingly, Santals were some of the earliest members of the Naxalite movement.

As the example of the Permanent Settlement and the Kosi River shows, the relationship between the environment and those who have the power to alter that environment has the ability to affect the poorest and the weakest peasants, those who are far away from the corridors of power. In the case of Cornwallis's policy, there was a direct link to early Company agrarian policy in Bengal and systemic agrarian unrest across East India. So powerful is the legacy of a policy of ecological Eurocentrism that it has the ability to affect social and political policy more than 200 years later.

CASE STUDY C: NARMADA BACHAO ANDOLAN (SAVE THE NARMADA MOVEMENT)

The Narmada River is one of the glories of Indian ecology and history. Rising from the Amarkantak Plateau in Madhya Pradesh, and flowing over 800 miles through valley and plains, the river forms the state's border with Maharashtra before eventually emptying into the Arabian Sea at the Gulf of Cambay in Gujarat. It is the fifth largest river in India. The river valley is sandwiched between two mountain ranges, the Satpura to the north and the Vindhya to the south; as such, the river in part forms the traditional boundary between North and South India.

The Narmada Valley is no less a wonder. Surrounded by mountains rising to almost 3,000 feet, the river meanders through a region composed of some of the oldest hardwood forests in India; teak in particular has been a major staple for the peasants and forest dwellers, particularly for constructing buildings and tools. The mountains are also home to some of India's most famous wildlife, especially tigers. In addition, boar, antelope, and hundreds of species of birds inhabit the hills and valley (www.worldwildlife.org). Until recently, a photograph of the valley would have emphasized the clear, flowing river, surrounded by green, deciduous trees, some clouded by an opaque mist. The valley epitomized the 19th-century romantic concept of nature's bounty.

The river, in its role as "the giver of bliss" (which is the Sanskrit meaning of Narmada), has an important function in Hindu mythology as well. Descending from the great god Shiva, the Narmada is arguably the holiest river in India; bathing in the Ganges washes away a mendicant's pollution, but the mere sight of the Narmada cleanses the individual of sin. Indeed, according to legend, the Ganges herself visits the river once a year, in the form of a coal-black cow; when



Flooded area of the Narmada Valley in 1993. (Kapoor Baldev/Corbis Sygma)

it emerges from the Narmada, the cow has become milky white (Baviskar 2004, 91). The round-trip journey between the source of the Narmada and the Arabian Sea is considered one of the most sacred pilgrimages a worshipper can undertake.

Historically, the human inhabitants have been mythologized as well, although with less benevolent intentions. We have seen elsewhere how the colonial government reacted to tribal groups, most of whom were forest dwellers or practiced swidden agriculture. Under the guise of civilizing the “noble savage,” adivasis were either forcefully settled or designated as members of Criminal Tribes. As D. C. Shah suggests, the colonial government took control of tribal regions “in order to exploit resources and maintain law and order, but with the pretext of conserving the tribal culture” (Shah 2003, 41). It is a ploy that did not disappear with colonial rule.

By the second half of the 19th century, colonially ordered changes in land use had become a feature of many, if not most, tribal regions. Along the Narmada, the teak was so valuable that those groves were quickly clear-cut; the rest of the forests became scientifically managed, and thus off limits for cultivators. As was often the case, outsiders moved into the Narmada region to take advantage of the adivasis’ inexperience with the market-oriented economy of which they were

now a part. Others migrated for positions as forest guards. The newcomers were caste Hindus for whom the adivasis were outcastes, on a social level with dalits. Yet the Narmada is no less sacred to the tribals than to the Hindus; she is the “generous, gift-giving girl” who spent so much time helping those along her journey that she was late in meeting her lover, the sea, who deserted her for her sister, the Tapti River (Baviskar 2004, 262, chapter 7).

This river, its valley and hills, and its people, have come to represent the conflict between development and environmental and cultural protection, not only in independent India but indeed wherever the complex issue of globalized commodification versus local productivity arises in the postcolonial world. It is a story that began in the 1940s, hibernated until the late 1970s, and emerged during the quarter century that bookended the new millennium, setting an example for grassroots, Gandhian responses to middle-class, Western-oriented, and value-laden projects across the globe. Its roots can be found in the commodification and social engineering that was so prominent in the middle of the 20th century and that has generated more than a half century of conflict and debate. Currently, the story does not appear to be one that will end happily for the region’s inhabitants.

It is not surprising that the Narmada Valley Project, (NVP) containing as it does the Sardar Sarovar Project (which will be the focus of this case study), should have a majority population of adivasis. All the other Multi-Purpose Valley Dam Projects (MPVDP) that we detailed in Chapter 10 had large tribal populations as well. There are a few reasons for this. Primarily, national policy, under the guise of tribal uplift, made it easy to confiscate dalit and adivasi land; the National Council on Applied Economic Research’s 1963 report on Madhya Pradesh made this point explicitly:

Since the tribal areas are exceptionally backward and primitive . . . top priority has been given to a programme of rapid industrialization and extension of means of communication to the most interior sections of the State. . . . Fortunately, the tribal areas of the State are rich in industrial and power potential. There is no reason why in the wider interest of the nation and in the long-term interest of the tribals themselves, industries should not be developed and localized in tribal areas. (Baviskar 2004, 81)

And so resettlement and rehabilitation were to be carried out across India, all done in the best interests of those very adivasis who were being displaced.

The Narmada Valley Project was one of the earliest of the Tennessee Valley Authority-inspired projects that we defined in Chapter 10. First conceived in 1946, the NVP was envisioned as the grandest of the grand, with 30 large dams, more than 100 medium-sized dams, and some 3,000 small dams. The early centerpiece of the project was to be the Sardar Sarovar Dam, located just beyond the



Sardar Sarovar Dam. (Sardar Sarovar Narmada Nigam Ltd.)

Madhya Pradesh border, in the Gujarati village of Navagam. In 1961, Jawaharlal Nehru laid the foundation stone for the dam; although construction of the project would not commence for another 20 years, the Government of Gujarat immediately began evicting the villagers of Navagam to make way for a town for the professionals (Scudder 2003, 14). Real planning for the project came next, with the appointment of the Khosla Committee. Headed by A. N. Khosla, who had been the first chairman of the Central Water and Power Commission as well as Nehru's big-dam czar at the height of project planning in the late 1940s and 1950s, the committee's 1965 recommendations were, as befit its chairman, gargantuan. The proposal placed the Sardar Sarovar Dam, the jewel in the project's crown, at a height of 530 feet, backing up the river enough to provide 13.9 million acre-feet of water for Madhya Pradesh, and 10.6 million for Gujarat. Quarrels over the size of the area to be submerged in Madhya Pradesh and over the acre-feet allowances and cost divisions among the three states (Maharashtra having become involved as well) led to a hiatus in planning and development for the next four years. In 1969, the Government of India broke the stalemate with the formation of the Narmada Water Dispute Tribunal. Only with the tribunal's decision some 10 years later did serious planning for the Sardar Sarovar Project (SSP) begin.

The tribunal's 1979 award limited the project's perspective, but only by a little. The Sardar Sarovar Dam's height was lowered to 455 feet, and the number of acre-feet was also decreased. Even so, the SSP, if completed according to the tribunal's directives, would still be the largest irrigation project in the world, affecting almost 4.7 million acres of land. It would also change the fortunes of between 200,000 and 1 million people, depending on whose statistics are believed. The most common estimates suggest that between 350,000 and half a million people in the valley would, in part or whole, lose the social, cultural, and agrarian existence they have known for centuries (Baviskar 2004, 199–205; Klingensmith 2007, 229; Roy 2002, 72–76; Scudder 2003, 14–18).

Of equal or greater importance, however, were the tribunal's plans for the resettlement and rehabilitation for the displaced inhabitants. Under the tribunal's award, Gujarat was to pay for resettlement and rehabilitation for the entire region, because that state would receive most of the benefits from the displacement of settlers in Madhya Pradesh and Maharashtra. Families that could prove that they held legal title to 25 percent or more of their land were guaranteed two hectares (about five acres) of irrigated land. For those families that qualified, sons who were 18 or older were given the same guarantee. Those who could not provide the title to a quarter of their land, or were undertenants or simply landless laborers, were entitled only to a plot of land on which to build a tenement (Scudder 2003, 8, 15–16). As we saw in Case Study B, many tribes were communal, and the headman held whatever legal rights to the land an adivasi community might possess. This often meant that the members of the group, with the exception of the headman, were dismissively considered "encroachers" and were ignored (Hill 1997, chapter 6; Scudder 2003, 15). When villages were resettled, they were not moved in clusters. This was crucial to the displaced, because their social, economic, and cultural networks were incorporated in the interactions of the contiguous villages. Many who did accept resettlement found themselves located on hardened soil with no source of water. The fortunate ones who received fertile, irrigable land often had it confiscated by the former landlords who had never received the promised monetary compensation from the government. Considering that decades were spent on resettlement, many boys were born and reached the age of 18 before their villages were even surveyed; none of them made the roll of those entitled to land. A generation of sons became, in effect, landless laborers.

Given the uncertainty of accepting the tribunal's resettlement and rehabilitation offer, most villagers opted not to migrate to Gujarat; others, disillusioned by the government's broken promises, returned to the valley. Those who refused to be displaced were subsequently treated under the terms of the Land Acquisition Act of 1894, a colonial contraption designed to commercialize land with as

little trouble and cost as possible. The 1894 act based eminent domain acquisition strictly on a cash-for-land basis. Those whose land was taken were to be repaid with cash, based on a “compensation which in [the collector’s] opinion should be awarded for the land.” While the cultivators could challenge the compensation, in reality they rarely did, constrained as they were by time and poverty. The act also decreed that “the Collector shall cause public notice of the substance of such deliberation [of land acquisition] to be given at convenient places at the said locality” (Government of India 1894). As convenience was based on the discretion of the collector, many of those whose land had been condemned were never informed until eviction notices (or more forceful announcements) arrived at their doors. In short, the meaning, if not the letter, of the resettlement provisions of the tribunal report was ignored from the start.

Once the 1979 award was announced, the search for funding began in earnest, with the World Bank as the primary target. The bank had been involved with irrigation projects in Gujarat for decades, but was not approached by the SSP officials until the early 1980s. By then, news of resettlement and rehabilitation controversies in the project had traveled well beyond the Narmada Valley, and between 1983 and 1985 the World Bank sent several missions to India to help develop and then review a comprehensive resettlement plan for the Sardar Sarovar Project. An agreement on the fair handling of displaced peoples led to a financing agreement on May 10, 1985, to take effect on January 6 of the following year. In the nine-month period between those dates, the World Bank sent another mission to report on the progress of the resettlement and rehabilitation program. Upon their return, one of the committee members who had participated in all the 1983–1985 missions, Thayer Scudder, strongly argued in the committee’s report “that the R and R [resettlement and rehabilitation] activities of the NDD [Narmada Development Department] since May 10, 1985 are not in compliance with the agreement signed between the Government of India and the World Bank” (Scudder 2003, 12). In spite of this, the funding date of January 6 remained in place.

The Narmada Bachao Andolan

At about the same time the World Bank was reaching its agreement to fund the Narmada Valley Project, a young graduate student, working toward her doctorate in social work, arrived in the valley as a volunteer and researcher. Her name was Medha Patkar, and she would change the dynamics of grassroots protest throughout the world.



Medha Patkar at a march against the barricading of Narmada Dam in India, July 31, 1999. (Kapoor Baldev/Corbis Sygma)

Patkar was born in Bombay in late 1954. Her father had been a freedom fighter during the independence movement, and her mother had worked for women's rights, so Patkar grew up in a family that strongly believed in volunteerism and social justice. In the late 1970s she earned a Master of Arts in Social Work from the Tata Institute of Social Sciences and spent the next few years working in the heart of Bombay's poorest neighborhoods. In the early 1980s she began volunteering in rural areas of Gujarat, and in 1985 she began her volunteer work in the region of the Sardar Sarovar Dam. For the next two years she concerned herself with gathering information about resettlement and disseminating her findings to the soon-to-be displaced. Patkar was not opposed to the dam *per se* at this time; rather, she was interested in organizing the adivasis in particular for the purpose of overseeing a successful resettlement and rehabilitation process. Over the course of the next two years, however, she became increasingly aware of the ecological consequences of the dam, which, apart from the immediate damage to the riparian ecosystem as a whole, included the ruination of natural fisheries, the possible extinction of a rare type of crocodile, as well as the danger to the tigers that we noted earlier. Patkar also began to believe the authorities had no intention of fairly resettling and rehabilitating the displaced. In this assertion she was joined by many of the residents, some of whom had been protesting since the inauguration of the project in 1961. In 1987, she announced her opposition to the entire project with the organization of several regional protest groups into the Narmada Bachao Andolan (NBA) (Pillalamarri undated).

If we look at some of the actions of authorities during this period, the reasons for Medha Patkar's disillusionment with resettlement are not hard to discover. Amita Baviskar, who probably knows the valley and its people better than any other scholar, quotes an adivasi woman named Binda, on the process of carrying out the land survey: "Last year . . . the surveyors came to Anjanvara to see what would be submerged by the dam. They had forty policemen with them, with guns and on horseback. . . . They went from house to house and made us all go to the [headman's] house. . . . When we saw what they were doing, we ran forward and snatched away their measuring tapes" (Baviskar 2004, 111). In response, the police attacked them, thrashing the villagers with their bamboo metal-tipped lathis. In the hills, the government expanded its contradictory process of rapid clear-cutting of valuable hardwoods while at the same time rigidly enforcing conservation laws by confiscating adivasi livestock that wandered into the forests, and by digging cattle-proof trenches. In several villages the forest dwellers began a satyagraha, lying down in the ditches so that digging could not continue. This stalemate escalated, with multiple, preemptive arrests of activists, culminating with a lathi charge that, combined with several policemen and forest guards opening fire, left a number of peasants wounded. As word of such events

spread through the Sardar Sarovar Project-affected area, grassroots organization began to gain in popularity, with the NBA as the nucleus.

Much of the early momentum that the NBA produced came from its organizational formula. As Baviskar notes, the movement was not limited to the immediate region of the Sardar Samovar Dam. Rather, she argues, the organization produced three separate branches, each extremely effective within its specific purview. The most immediate, of course, was the coalition of rural-based peasant organizations, which sent thousands of volunteers to participate in *satyagrahas*. These actions included marches, sit-ins, fasts, and *dharnas*, which combined all three. The second level involved national non-government organizations (NGOs). These groups raised urban awareness for the potential victims of the Sardar Sarovar Project. At various times since 1987, hundreds, at times thousands, of city dwellers traveled to the Narmada Valley to join in nonviolent protests. These included Indian celebrities, the most famous of whom, Arundhati Roy, would help to make the movement an international cause célèbre, thanks to the Indian Supreme Court. Finally, international NGOs played an important role, not only in advertising the cause, but indeed in closing the money spigots crucial to completing the project. The Japanese branch of Friends of the Earth helped to eliminate Japanese funding of the SSP, while U.S.-based NGOs, with the assistance of the international environmental community, persuaded Congress to withhold World Bank funding for the NVP, thus forcing the bank to reconsider its participation in the project (Baviskar 2004, 202–205; Roy 2002 87).

Local-level campaigns proved to be effective on several fronts; not only did they raise national and international awareness of the plight of the Narmada population, but they also succeeded in delaying various aspects of the project. Early protests revolved around corruption and social injustice. Because most government employees, from the collectors to the police and down to the forest guards, were caste Hindus, the *adivasis* and the *dalits* believed their concerns were either ridiculed or ignored. So issues such as bribery, unannounced police residential intrusions, and the indifference of government officials about informing the villagers of the project's timetable dominated popular awareness in the middle of the 1980s. With the founding of the NBA in 1987, and the subsequent disillusionment with the entire Narmada undertaking, both direction and tactics changed. Although the goal of halting the dams became the primary focus, *satyagrahas* and *dharnas* became the main tactics, in the hope of raising international awareness. In this the NBA was spectacularly successful.

Beginning in the late 1980s, the campaigns increased in size and fame. In February 1989, some 8,000 people marched to the site of the dam. The fact that many faced police harassment simply drew more sympathy for the cause of the

dislocated. The seminal event occurred on September 28, 1989, when tens of thousands of individuals (estimates vary widely from 25,000 to 60,000) from all corners of India, and, indeed, the globe came together in the valley for the National Rally Against Destructive Development, which, as Baviskar notes, came to be known as “the coming of age of the Indian environmental movement” (Baviskar 2004, 206). Under the slogan “we want development, not destruction!” they advertised the social oppression and environmental destruction that the project continued to produce. The following March upwards of 10,000 participated in a dharna that blocked the Bombay-Agra highway, backing up traffic for miles. They disbanded with a promise from the chief minister of Madhya Pradesh to review the project, a vow that was immediately forgotten.

Arguably the most important satyagraha occurred in December 1990, when the NBA set out for the Sardar Sarovar Project to practice active, nonviolent, civil disobedience by camping at the site so that construction would be halted. The group, however, was blocked by an army of police at the border of Madhya Pradesh and Gujarat. Refused admission into the state, about 2,000 protestors spontaneously began a sit-in at the border. Although the government refused to negotiate or even talk to the NBA leaders, the rest of the world was listening. The following year, thanks in a large part to the continuing and expanding protests of the NBA, the World Bank formed the first independent review in its history to inspect the environmental and resettlement impact of the project (Baviskar 2004, 202–209; Scudder 2003, 13).

The independent review was chaired by former U.S. congressman Bradford Morse, and its report, released in 1992, became known as the Morse Report. It was scathing in its criticism of both the Narmada Valley Project and the World Bank’s participation in it. The report noted that waterlogging and salinity had become so severe in the dam area that large patches of eminently cultivable land now had to lie fallow. The pressure to grow cash crops such as sugar cane, which require a great deal of groundwater, had led to a further rise in the water level and deterioration in water quality.

The Morse Committee saved its most critical comments for the resettlement and rehabilitation program. We have discussed the abysmal state of the displaced earlier, so we will only briefly note that the Morse Committee found that the number of families to be displaced had been drastically underestimated, and there was little suitable land available for any of those who agreed to resettlement and rehabilitation. The Morse Report came to a remarkable conclusion, certainly by World Bank standards: “We think that the Sardar Sarovar Projects, as they stand are flawed, that resettlement and rehabilitation of those displaced by the Projects is not possible under prevailing conditions. . . . Moreover we believe that the Bank shares responsibility . . . for the situation that has developed” (Scudder

2003, 13). The panel urged that the project be suspended until the problems were fixed; instead, the World Bank gave India five months to bring the project up to regulation. When the deadline was not met, the loan was rescinded on March 31, 1993. It was one of the NBA's greatest victories. The second came two years later. In 1994, the NBA filed a writ before the Supreme Court of India, asking for a suspension of construction until the government could show that the terms of the resettlement and rehabilitation requirements, as specified in the Narmada Water Dispute Tribunal's 1979 award, had been fulfilled. In response, the Government of India formed the Five-Member Committee to review the progress of rehabilitation of the displaced. In January 1995, after the committee essentially confirmed the findings detailed in the Morse Report, the Supreme Court approved the writ and suspended construction until the requirements listed in the 1979 award were fulfilled (www.dams.org).

With this, supporters of the Narmada Valley Project brought out the big guns. The Supreme Court was deluged by enormous political pressure and forecasts of economic doom if the suspension was not lifted. At the time work was suspended the dam's height stood at just over 262 feet. In 1999, the court allowed the height to be raised by five meters to 279 feet, as long as a good-faith effort was being made to resettle those affected. In October 2000, the Supreme Court, disregarding the Five-Member Committee's recommendations, allowed the Sardar Sarovar Dam to increase in size to 90 meters (290 feet) in five-meter increments, providing that it met the resettlement and rehabilitation requirements of the 1979 award. The decision was widely seen as a compromise, but in fact it simply reaffirmed a policy that had been disregarded for the previous two decades.

The Supreme Court's decision had serious repercussions. Many saw it as so blatantly prodevelopment that a large number of people who had been fence-sitters became vocal supporters of the NBA. Many within this group, such as Salman Rushdie, began writing informational essays in journals with large circulations in the West. Arundhati Roy, who had been involved with the movement before the Supreme Court decision, became an especially articulate advocate for the NBA. As a recipient of the Booker Prize, the most prestigious literary award throughout the former British Empire, for her novel *The God of Small Things*, she was an intellectual star throughout India and around the world. Perhaps it was the high respect she generated that caused the Supreme Court to focus its ire on her in particular.

The decision also reinvigorated the satyagraha against the Narmada Valley Project. Although the Narmada Bachao Andolan remained nonviolent, it became more aggressive, carrying out dharnas with much more frequency, and adding jal samarpan, or sacrifice by drowning, to its arsenal. Shortly after the court's deci-

sion in 2000, Medha Patkar began a dharna outside the gates of the Supreme Court. Along with her followers, she sat, fasted, and prayed for a change in the judiciary's lack of foresight. In a new and different tactic, however, rather than applying physical threats, the NBA's opponents filed a writ before the Supreme Court, accusing Medha Patkar, Arundhati Roy, and an NBA attorney of contempt of court and "attempt to murder" (Roy 2002). The three petitioners claimed that their exit from the court building had been blocked by Roy and Patkar, who then began shouting slogans such as "[he is] the tout of the judiciary," and "kill him!" Considering this last phrase was purportedly screamed by Patkar, a woman who had devoted her life to nonviolence, and that one of the pleaders was proven to be in a completely different location at the time, it was hard for most to take the charges seriously. Nonetheless, the Supreme Court agreed to hear the case, seemingly with great alacrity. When Roy had the temerity to point this out, suggesting in her affidavit that this seeming eagerness "indicates a disquieting inclination on the part of the court to silence criticism and muzzle dissent, to harass and intimidate those who intimidate it," she was slapped with another contempt citation. Although the first charges were dropped, Roy served one night in prison and paid a fine of 2,000 rupees for the second contempt charge (Roy 2002).

Meanwhile the dam kept growing. In February 2002 it was authorized for a height of 328 feet; two years later the court gave permission for 360 feet. Throughout this process the NBA kept campaigning against the project, while the authorities kept finding new ways to suppress the protests. In 2000, the government declared the entire Narmada Valley Project to be under the auspices of the Official Secrets Act and could thus ban any satyagrahas and dharnas at the site. Amnesty International reported that when rallies were held, participants were put under "preventive detention" and released only after the meetings ended (Amnesty International 2001). The following year, the Indian government refused to issue a visa to the secretary-general of Amnesty International (Kalesh 2003).

Still the Narmada Bachao Andolan pressed on. Patkar held sit-ins and fasts in the affected areas and in urban settings to call attention to the dispossessed. In the early years of the 21st century, however, a series of events forced the government to reconsider its policy of build first and worry about displacement later. From 2003 through 2005 (and continuing today) a series of monsoon floods forced the Narmada authorities to open the gates of several of the dams, allowing tons of water to rush through villages where resettlement plans had not yet been enacted. Thousands were left homeless, and the photographs of poor peasants clinging to their submerged huts were a public-relations disaster for the project. In April 2006, Patkar undertook a highly publicized fast, vowing to die unless a comprehensive study of the plight of the displaced was undertaken. That same

month the United Nations Special Representative on Human Rights issued a report suggesting that the police were using violence against those participating in the dharna and urging that construction be suspended until the basic human rights of the displaced could be guaranteed (United Nations 2006). As Patkar's fast continued, with the Government of India's water resource minister publicly supporting the view that resettlement and rehabilitation were not conforming to legal guidelines, pressure on the authorities grew. Finally, on April 17, Patkar ended her 20-day fast when the court agreed to halt the project if it found that resettlement and rehabilitation were not being carried out according to regulation. In light of the Supreme Court's ruling, the prime minister quickly appointed the Sardar Sarovar Project Relief and Rehabilitation Oversight Group, commonly called the Shunglu Committee after V. K. Shunglu, its chair. The committee was given fewer than two months to research and release its findings.

The Shunglu Report was distributed on July 3, 2006. Several of its conclusions formed the nuclei around which protest swirled. The Shunglu Committee found no errors on the government's estimate of the number of people yet to be resettled. The report also claimed that many of the displaced eagerly and voluntarily accepted cash payments for their property. On the one hand, the investigation found that 80 percent of the resettlement sites were average or good, yet on the other they claimed that the construction of houses and the actual resettlement of the population in those areas was very poor. However, they reported, "in conclusion, the issue is of upgrading facilities to the required standards and this can be accomplished during the current fiscal year" when no further work on the dam was as yet planned (Shunglu, Chadha, and Narayan 2006). In other words, there was no need to suspend or even slow down the construction process of the Sardar Sarovar Dam.

The NBA was stunned. They pointed out that the three-hour presentation they had given to the Shunglu Committee had not even been referenced in the report. They issued a press release responding to each conclusion that the committee had reached. The NBA noted that since the 1979 award specifically ordered land-for-land exchanges, whether or not peasants agreed to take cash payments was irrelevant. They pointed out that the estimate of the number of dispossessed had not included sons now grown to adulthood or those who had returned to the Narmada Valley from resettlement sites, so that there must have been deviations. Finally, they attacked the committee's claim that although the construction of new homesteads and villages for the resettled was in very poor condition, the process could reach a satisfactory conclusion in less than a year. The NBA ended its evaluation of the report by quoting the Gujarati adivasis affected by the project: "The dam is not the life-line of the adivasis, but a death noose" (www.narmada.org).

Events soon seemed to validate the NBA's criticisms of the report. Although the Shunglu Committee had stated that no work on the dam would be carried out during the following year, by the end of 2006 the dam had risen to 400 feet in height. On January 2, 2007, the Gujarat chief minister Narendra Modi announced that the Sardar Sarovar Dam was effectively complete; all that remained was the installation of gates, which would raise the dam to its final height of 455 feet (www.supportnarmadadam.org). The next day Patkar and 400 of her followers began a dharna at the Ministry of Social Justice and Empowerment, announcing that the time had come for "indefinite agitation" (Parsai 2007). The Gujarat government responded with a writ to the Supreme Court, accusing the NBA of sedition. The Madhya Pradesh government followed this up with its own charge of treason against the NBA, claiming the organization took money from foreigners who were interested in delaying or halting the resettlement and rehabilitation of the adivasis of the Narmada Valley. Meanwhile, the Narmada crushes against its concrete jail, waiting to be released.

Conclusion

In her nuanced and detailed study of the Narmada adivasis, Amita Baviskar makes a perceptive argument concerning the Narmada Bachao Andolan. The NBA, she suggests, is rightly famous for raising global awareness that grassroots peasant movements, when well organized and publicized, can be victorious in the seemingly impossible battle against commercialism and money. But, she asks, how successful was the NBA in fulfilling its original goal? "The Andolan," she argues, "has been a globally influential movement, one that has shaped millions of people's understanding of large dams. . . . Yet when we assess how the Andolan changed the world, which it surely has in profound ways, we will also have to ask: how did it change the world of the poor adivasis who formed its core?" (Baviskar 2004, 279). Baviskar convincingly concludes that the answer is—not much. She does not, however, address the reasons for this. Why, in spite of a campaign that was as Gandhian as the Mahatma himself could have planned, and which brought about enormous sympathy for the dispossessed and abandoned, is the Sardar Sarovar Dam on the verge of opening its sluices?

Looking at late colonial and independent India, we may well argue that the answer lies in the magic elixir of development. For two centuries India, as well as the rest of the colonized world, was told that its citizens were not civilized and intellectual enough to produce and apply modern science and technology for their own betterment. This rationale was used universally, for it justified environmental pillaging as well as limiting indigenous industry. Indeed, modern

developmental theory admits as much; for decades the “third world” was synonymous with the “underdeveloped world.” As such, projects such as the Narmada, Bhakra, and Damodar took on a symbolic value that overshadowed social justice for the dispossessed. Time and again planners and politicians have repeated the phrase that the tribals must suffer for the good of the nation. The adivasis are the descendants of the people Gandhi held up as examples of colonial injustice, but modernization as a rebuttal to imperial stereotypes of superiority has become such a potent symbol that the original purposes of the projects, and the people they were designed to help, have often become invisible. This too is a legacy of colonial attitudes toward the environment.

In 1961, while speaking at the site of the Pong Dam, the future prime minister of India, Morarji Desai, gave this advice to the residents of the villages that blocked the dam’s progress: “We will request you to move from your houses after the dam comes up. If you move it will be good. Otherwise we shall release the waters and drown you all” (Roy 2002, 55). Although the language has become more polite, in many ways the meaning is still the same. Progress trumps traditional culture every time.

IMPORTANT PEOPLE, EVENTS, AND CONCEPTS

1848 ORDINANCES Legislation in Sri Lanka that ended import and export duties, which were a financial burden on the European planters, and replaced them with a series of taxes imposed on the peasantry. Ordinance 12 also transferred all forest lands to the crown, in the process abolishing the rights of ownership of forest dwellers. These changes were catalysts for the Rebellion of 1848.

1857 REBELLION An uprising in North India that started as a sepoy mutiny but rapidly spread across the region. Peasants destroyed landlords' records and princes declared battle against the British East India Company. Although it was suppressed within a year, the 1857 Rebellion permanently changed the relationship between South Asians and the British.

AGE OF CONSENT ACT OF 1891 This act, which raised the consensual age for marriage from 10 to 12, was the only piece of social legislation enacted by the 19th-century colonial government in the period following the 1857 Rebellion.

AGNI Hindu god of fire.

AKBAR (1542–1605) The greatest ruler of the Mughal Empire, Akbar expanded Mughal control of India below the Krishna River. He introduced the mansabdari system, which had a profound effect on agriculture and the environment.

ALEXANDER OF MACEDONIA (356–323 BCE) Also known as Alexander the Great, he attempted to conquer India in 326 BCE. Although he defeated the Nandas, his troops rebelled, and Alexander was forced to retreat. The vacuum left by his withdrawal allowed for the rise of the Mauryas.

ALI (CA. 600–661) The cousin and son-in-law of the Prophet Muhammad. Shiite Muslims believe Ali was the proper person to assume leadership of the Islamic community upon the death of Muhammad.

ALIENATION A concept that is based on the argument that the farther land-owners live from their lands, the less they care about their usage. The term has been applied in India to absentee zamindars and agribusinesses.

AMBEDKAR, BHIMRAO RAMJI (1891–1956) Leader of the dalits during the independence movement and law minister after independence. Ambedkar is credited with writing India's constitution, but he was also a strong supporter of multipurpose river valley development projects.

AMRITSAR MASSACRE On April 13, 1919, about 10,000 Punjabis gathered at Jallianwala Bagh, a park in the city of Amritsar, to celebrate a spring festival. Claiming the event was illegal, Gen. Reginald Dyer had his troops close off the only entrance and exit and open fire. By the time the troops ran out of ammunition, some 400 people lay dead. The Amritsar Massacre was the final nail in the coffin of a moderate nationalist movement that demanded self-governance within the empire. From this point on, the demand was independence.

ARYABHATA (476–550) Brilliant mathematician who speculated that the world was round and revolved on an axis, that the year was composed of 365.36 days, and that pi should be calculated at 3.1416.

ARYAN INVASION (CA. 2000–1500 BCE) Although the effects of the invasion are contentious, archaeological evidence suggests that in the second millennium BCE, because of overpopulation in central Asia, an ethnolinguistic group known as Aryans swept through the Hindu Kush into North India, perhaps in the process destroying the Indus civilizations. This last aspect is by no means universally accepted, however.

ASHOKA (269–232 BCE) The greatest emperor of the Mauryan Empire, Ashoka expanded India's borders across the subcontinent. He converted to Buddhism, after which he preached nonviolence, vegetarianism, and a respect for nature.

ASHRAF A Muslim of Afghan descent who migrated to Bengal.

ATTLEE, CLEMENT RICHARD (1883–1967) British prime minister of the Labour Party who succeeded Winston Churchill in 1945, Attlee presided over the decolonization of the parts of the British Empire and endorsed Indian independence.

AURANGZEB (1618–1707) Last of the great Mughal rulers. His wars against the Marathas eventually forced him to move his capital to South India, fatally weakening centralized control. By the time of his death in 1707, the Mughals controlled most of India in name only.

AYURVEDIC Traditional indigenous system of medicine found in South Asia and Tibet.

BABUR (1483–1530) Founder and ruler of the Mughal Empire from 1526 to 1530.

BANERJEA, SURENDRANATH (1848–1925) An early Indian nationalist, Banerjea became a cause célèbre when, in 1869, he passed the Indian Civil Service

exam, yet was accused of lying about his age and was dismissed from the service. He spent the rest of his life pointing out the discrepancies between colonial promises and actions.

BATTLE OF KALINGA (261 BCE) Battle in which Ashoka defeated his enemies in Orissa. The ruthlessness of the battle, which left more than 100,000 dead, was a catalyst for Ashoka's conversion to Buddhism and his promotion of vegetarianism and nature protection.

BATTLE OF KURUKSHETRA (CA. 900 BCE) Battle between the Aryan migrants and indigenous peoples, in which the Aryan triumph opens up the vast Gangetic Plain to Aryan settlement and agriculture.

BENGAL ALLUVION AND DILUVION REGULATIONS The 1825 regulations declared that land that emerged from a moving river was an addition to the land it bordered. This meant that a landlord who had lost land to the river years earlier no longer had any proprietary rights to it when it emerged from the river. The 1847 Regulations affirmed this declaration but abolished revenue payments on land that was deluged by a moving river. The acts were the focus of numerous lawsuits by zamindars, stretching beyond Indian independence.

BENGAL TENANCY ACT OF 1885 Provided nominal security for the peasantry of North India in that the cultivators could not be evicted from their lands if they could produce rent receipts proving that they had "occupied" the same plot of land for 12 consecutive years. Zamindars quickly stopped issuing rent receipts upon the passage of the act.

BENTINCK, WILLIAM (1774–1839) Governor General of India from 1828 to 1835, Bentinck was the strongest supporter of utilitarianism in the administrative hierarchy. He is best known for his "abolition" of sati and thuggi.

BHAGAVAD GITA "The Song of the Lord," the Gita is the centerpiece of the epic poem *Mahabharata*. In it the chariot driver of the hero Arjuna reveals himself to be the god Krishna, and he teaches Arjuna the concepts of karma yoga and bhakti yoga, which transform Hinduism.

BHAGHIRATHA Hindu god responsible for the flow of the Ganges River.

BHAKRA-NANGAL PROJECT Located in the Punjab, the Bhakra Project was the showcase Multi-Purpose River Valley Development (MPRVD) scheme during Jawaharlal Nehru's prime ministership. At the dedication of the Bhakra Dam, Nehru uttered his famed statement that suggested that dams were the new temples of India.

BHATTACHARJEE, KAPILPRASAD (1904–1989) Bengali engineer who, in the 1950s, began to warn of the negative environmental consequences of both the Damodar and Hirakud projects. Although his predictions largely came true, he was ignored at the time.

BUCHANAN, FRANCIS HAMILTON (1762–1829) An early colonial ethnographer, Buchanan's reports from Bihar and Bengal in the early 19th century set the framework of "improvement" and "progress" that led to commodification throughout the presidency.

BUDDHA (CA. 566–486 BCE) The founder of the Buddhist religion. Born Siddhartha Gautama, he was a kshatriya prince in a kingdom straddling India and Nepal. Although he was raised in a life of luxury, he was unhappy, and as a young man began a search for contentment. The result was Buddhism.

BUDDHISM An Asian religion based on the philosophy of Siddhartha Gautama, who became the "Enlightened One," or the Buddha. Buddha believed in a middle ground between harsh asceticism and consumerism. He preached the Eightfold Path, which claimed that suffering and desire could be defeated by following a series of righteous practices.

CABINET MISSION PLAN (1946) A final attempt to keep India whole, the plan called for a loosely federated India in which Muslims in Northwest India and Bengal would control all ministries except foreign affairs, communications, and defense. When Jawaharlal Nehru effectively rejected the plan, partition became inevitable.

CASTE SYSTEM The grouping of members of the Hindu religion into hierarchical categories. Caste is inherited, and, in theory, one may not marry outside one's caste group.

CAUVERY WATER DISPUTE TRIBUNAL A commission formed by the Government of India in 1990, the tribunal's mission was to allot the waters of the Cauvery to the states of Tamil Nadu, Karnataka, and Kerala in an equitable fashion. It took the committee more than 16 years to produce a resolution that satisfied none of the parties.

CENTRAL WATER IRRIGATION AND NAVIGATION COMMITTEE (CWINC) Formed in 1945, the CWINC was the central authority for all large-dam schemes. Its micromanagement often led to a misreading of the local society and environment, with negative consequences for both.

CHARTER ACT OF 1813 An act of Parliament that opened India up to missionary activity; the Charter Act also brought limited free trade to India.

CHIPKO MOVEMENT Grassroots movement that arose in independent North India; it was designed to stop commercial deforestation. Villagers in the Himalayan foothills would "hug" trees to prevent their being cut. The Chipko movement has become a global model for ground-level social movements.

CHURCHILL, WINSTON (1874–1965) Prime minister of Britain during World War II, he had a deep-seated animosity toward the leaders of the independence movement, toward educated Indians in general, and toward Mahatma Gandhi in particular. Although a hero in the West, Churchill was widely hated in South Asia.

CINCHONA Medicinal plant whose bark produced quinine, which was used to prevent malaria. In late 19th-century Sri Lanka, cinchona briefly replaced coffee as the main plantation crop.

CITIZENSHIP ACT OF 1949 Legislation passed in independent Sri Lanka that effectively denied citizenship to the descendents of Tamils who had migrated from India as plantation workers.

CIVIL DISOBEDIENCE MOVEMENT (1930–1934) Mahatma Gandhi's second satyagraha, which centered on the Salt March. The colonial government had a monopoly on the production and sale of salt, and in 1930 Gandhi marched almost 300 miles to the sea to illegally produce salt. The march, which took almost a month to complete, gained international attention, and for the first time alerted much of the world to India's independence movement.

CIVIL LINES After the 1857 Rebellion, areas near military cantonments were set aside for British neighborhoods. Claimed as safety precautions, the Civil Lines were strictly segregated; only Indian servants and the rare guest were allowed into the areas.

CLIVE, ROBERT (1725–1774) The mythologized founder of the British Empire in India, "Clive of India" defeated Bengali forces at the Battle of Plassey in 1757; by 1764, the Mughals recognized the East India Company as the official revenue collectors for all Bengal.

COLD WAR The term given to the period between 1945 and approximately 1990 that described the cool political relationship between the Soviet bloc and the American bloc.

COLEBROOKE-CAMERON REFORMS The 1833 reforms that ended East India Company monopolies in Sri Lanka. Rajakariya was also abolished.

COLLEGE OF FORT WILLIAM The first institution for Indian Civil Service training. Located in Calcutta and founded by Governor General Wellesley in 1800, it closed only six years later, when the government decided that a better education could be offered in England.

COMMODIFICATION A term that refers to the act of looking at nature simply in terms of its financial value rather than viewing the environment as having intrinsic worth.

COOPERS HILL COLLEGE The common name for the Royal Indian Engineering College at Coopers Hill. Founded in 1880, the college was meant to provide an education in Europe for Public Works Department engineers. Like Hailbury before it, Coopers Hill was seen as providing a better education than one could receive in India because of the college's proximity to the centers of European scientific and technological advancements.

CORNWALLIS, CHARLES (1738–1805) The second governor-general of the East India Company (1786–1793). Cornwallis introduced the Permanent Settlement as well as other regulations that became known as the Cornwallis Code

COTTON, ARTHUR (1803–1899) Arguably the most famous of all colonial irrigation engineers, Cotton made his name by building irrigation works along the Cauvery and Godavari river systems. Later in life his reputation was sullied by a disastrous plan to privatize all irrigation and canal systems in India; he envisioned replacing the Indian railway system with a network of navigable canals across the subcontinent.

CURZON, GEORGE (1859–1925) Viceroy of India from 1899 to 1905. Curzon was the most hated viceroy in colonial history and was responsible for the partition of Bengal in 1905, as well as other legislation designed to limit Indian nationalism.

DALHOUSIE, MARQUESS OF (JAMES ANDREW BROUN-RAMSAY) (1812–1860) Governor General of India from 1848–1856, Dalhousie and his actions were partially responsible for the 1857 Rebellion. In particular, his policies of “lapse” and “paramountcy” alienated the prince, landlords, and peasants of Awadh, which became a focal region of insurrection.

DAMODAR VALLEY PROJECT (DVP) MPRVD project in Bengal and Bihar. The DVP was a response to the 1943 famine in Bengal and was arguably the project that most directly imitated the Tennessee Valley Authority.

DANGEROUS TRIBES ACT OF 1871 Legislation that labeled all members of specific ethnic groups as criminal or dangerous. The labeling was hereditary, and it allowed the government to limit the mobility of those so described. The act was used as an instrument to force nomadic tribes into sedentary agriculture.

DEEP ECOLOGY A philosophy that suggests that most environmentalism is human-centered rather than egalitarian. Deep ecologists call for biospheric equality rather than the human tendency toward a hierarchical ranking of ecosystems and their inhabitants.

DIPENDRA Crown Prince of Nepal who in 2001 murdered virtually his entire royal family. The parliament responded by limiting the power of the monarchy, thus paving the way for the rise of democracy.

DRAIN OF WEALTH THEORY The belief that Indian poverty could be traced to a corrupted colonial practice of free trade, which allowed the extraction of South Asian raw materials to Britain at a pittance while artificial taxes made English finished products cheaper than indigenous ones. As a result, all true wealth was “draining” to Britain and no wealth was returned to India.

DRAVIDIAN The indigenous language group found primarily in South India, which includes Telugu, Tamil, Kannada, and Malayalam among its primary languages.

DYER, GEN. REGINALD (1864–1927) “The Butcher of Amritsar,” Dyer was responsible for the Amritsar Massacre, in which he ordered his troops to open fire on a celebration being held in a park in the city of Amritsar. The murder of nearly 400 civilians was a turning point in the nationalist movement. The fact that Dyer returned to a hero’s welcome in England emphasized the difference between colonial words and deeds.

EAST INDIA COMPANY The trading company given a monopoly for trade in India by Queen Elizabeth I in the 16th century. The Company began as one of a large group of traders in South Asia and evolved into the ruler of the Indian subcontinent. After the 1857 Rebellion, the Company was officially replaced by the crown as the imperial power.

EAST INDIA IRRIGATION AND CANAL COMPANY Founded in 1861, the East India Irrigation and Canal Company was Arthur Cotton’s other private company (along with the Madras Irrigation Company). It was organized to build irrigation works along the Mahanadi River system in Orissa. Like its sister company, it soon went out of business.

EHRlich, PAUL (1932–) Famous environmentalist who in the late 1960s warned of a “population bomb” that could lead to global famine.

EL NIÑO Anomalies in the surface temperature of oceans that may change the patterns of monsoon rains.

ENCLOSURE ACTS In late medieval Europe, enclosure acts accompanied the rise of protocapitalism, which was characterized by a shift from common land, used by all for common grazing, to privately owned, enclosed fields.

EUROCENTRISM The belief that all progress, morality, and civilization emerged from the West. Eurocentrism included a view that Indian customs and knowledge were of little value when engaging with nature and landscape.

FARRAKA BARRAGE Built by India on the lower Ganges, the barrage diverted waters that otherwise would have run through Bangladesh, in order to flush out the siltation from the port of Calcutta. The barrage has been a detriment to many aspects of Bangladesh’s economy and ecology.

FATEHPUR SIKRI Akbar’s capital, it was purposely built away from the center of clerical power. The city became a symbol of the emperor’s

independence; however, he was forced to abandon it in 1585, perhaps because of the movement of the Jamuna River, which denied the city its source of water.

FEUDALISM A political and economic system that is driven by a social hierarchy based on loyalty in return for protection. Simplistically, it involves peasants (or serfs) producing sustenance and surplus for the lord of the region in return for his protection in times of war or famine. Although it has been applied to Indian economic history, the term is more pertinent to Europe and other parts of Asia.

FIVE-MEMBER COMMITTEE Formed to respond to charges by the Narmada Bachao Andolan that the stipulations for resettlement and rehabilitation had not been fulfilled, the committee confirmed the findings of the Morse Report. As a result construction of the Sardar Sarovar Dam was suspended in 1995.

FIVE-YEAR PLANS Economic plans in Nehruvian India, the five-year plans were based on the Soviet model and were intended to forecast the agricultural and industrial goals for the following half decade.

FREE TRADE The concept that more people are helped by abolishing monopolies. Free trade, it was argued, led to competition, which in turn led to lower prices and better quality.

GANDAK PLAN OF 1959 Final joint project between India and Nepal. The plan, which called for irrigation of 5 million acres of land in India and only 343,000 acres in Nepal, led to such anger in Nepal that a third and final joint project was cancelled.

GANDHI-IRWIN PACT The result of the civil disobedience movement. Mohandas Gandhi agreed to attend a conference in London to discuss India's future. In return Gandhi suspended civil disobedience but was widely seen as giving a great deal for a small return.

GANDHI, MOHANDAS KARAMCHAND (1869–1948) Bestowed with the honorific "Mahatma," or "Great Soul," Gandhi was the father of the Indian independence movement. Through his use of active nonviolent resistance, satyagraha, and control of the Indian National Congress, Gandhi changed the nationalist movement from one that was fought on European terms to one that was distinctly Indian. As a result he gained a mass following that the British could not ignore, and in August 1947 they quit India. Gandhi was assassinated by radical Hindus in 1948.

GANESH One of the most popular gods in the Hindu pantheon, Ganesh has the head of an elephant and the body of a human. As the god of good fortune, he became an important icon in the independence movement.

GANGES CANAL Begun in 1854 and completed more than a decade later, the Ganges Canal in the Upper Provinces was the first original British irrigation scheme.

GOYIGAMA Elite class of rice cultivators in Sri Lanka.

GRAND ANICUT A marvel of ancient engineering, the Grand Anicut is the oldest functioning dam in the world. It was originally built on the Cauvery River in the first century and provided irrigation for a large portion of Tamil Nadu. The Grand Anicut was reconstructed by Arthur Cotton in the 19th century, and it still forms a central piece of the Cauvery irrigation system.

GRAND TRUNK ROAD Originally conceived during the Mauryan Empire, the road came to fruition during the reign of Sher Shah in the 16th century. It was metaled by the British. The road at one time extended from near Dhaka to Kabul and is still the major thoroughfare across India and Pakistan, ending at Peshawar.

GREEN REVOLUTION Beginning in the early postindependence period, India began the use of high-yield variety genetically altered grains. Through the use of these new seeds, irrigation, and chemical fertilizers, crop production could be increased significantly. This process was known as the “green revolution.”

GUPTA EMPIRE (320–550) The Guptas are credited with bringing about the classical era in Indian history. The Gupta dynasty saw the development of modern Hinduism, the work of the author Kalidas, and the creative period of the great mathematician Aryabhata.

GORKHA Ethnic group found primarily in Nepal. The British defined the Gorkhas as a “martial tribe,” and they subsequently became a mainstay in the British Army.

GURU GRANTH SAHIB The Sikh holy book that contains a collection of the sayings of early Sikh gurus among other sacred utterances.

HAILEYBURY COLLEGE The popular name for the East India Company College at Haileybury. For half a century Haileybury educated generations of Indian Civil Service recruits who formed a bond that tended to be much stronger than their bond with India.

HANUMAN Another enormously popular Hindu god, Hanuman is the monkey God. He helped Ram rescue Sita in the *Ramayana*.

HASTINGS, WARREN (1732–1818) First governor-general of India, Hastings was an Orientalist who believed local knowledge and custom were necessities for administering India with competence. He was eventually disgraced and impeached; the scandal played a major role in the extinction of the Orientalist School.

HEMILEIA VASTATRIX A form of fungus that destroyed the coffee plantations of Sri Lanka in the 1970s.

HETERODOXIES The collective name for Buddhism and Jainism, because the two religions departed from the central tenets of Brahmanism in several crucial ways.

HIGH-YIELD VARIETY Genetically-altered cereal seeds that produce significantly more grain than the natural seeds.

HINDUISM Generic name, promoted by the British, for the major religion they found in India. The term in fact describes various forms of belief that evolved from early Indian tradition. In the simplest terms, it is a monotheistic religion, with thousands of gods who are manifestations of the one universal deity. The fundamentals of the religion involve dharma, karma, and moksha, which are defined in the Glossary.

HIRAKUD DAM PROJECT One of the early MPRVD projects, the scheme in Orissa has still not been completed, nor have many of the displaced been resettled.

ILBERT BILL One of the turning points in the history of Indian nationalism. The Ilbert Bill, introduced in 1884, would have allowed British citizens to face trial by Indian judges. The huge outcry on the part of the European community forced the government to withdraw the bill. The reaction was a catalyst for the founding of the Indian National Congress the following year.

INDIAN ARMS ACT OF 1878 This act prohibited gun ownership by native Indians.

INDIAN CIVIL SERVICE The administrative body of colonial India. The ICS, as it was known, was responsible for law, justice, and revenue collection. The ICS essentially governed South Asia at the local level throughout the colonial period and was the model for the postindependence Indian Administrative Service.

INDIAN COUNCILS ACT OF 1861 The first act to provide a small form of representation for the Indian population, the Indian Councils Act provided for a 15-member viceregal advisory body composed of the loyal classes of zamindars and princes.

INDIAN FOREST ACTS The 1865 act introduced the concept of "reserved forests," which meant the timber was reserved for the government. The 1878 act, arguably the most important piece of forestry legislation in colonial India, introduced direct state control of reserved forests under the guise of "scientific forestry."

INDIAN MEDICAL SERVICE The East India Company's medical service, originally formed to service European Company employees. Increasingly the

Indian Medical Service focused on contagious diseases, which the service believed originated from South Asia's climate and environment.

INDIAN NATIONAL CONGRESS Founded in 1885, the Congress was the nationalist organization that, under the leadership of Mahatma Gandhi, led India to independence.

INDUS CIVILIZATION (CA. 2600–1600 BCE) One of the four earliest river valley civilizations (China, Egypt, and Mesopotamia being the other three). For its time, the Indus Valley had a sophisticated society featuring uniform cities containing multistoried buildings, some settled agriculture, and water drainage systems, among other innovations. Several theories suggest different reasons for its disappearance, including environmental changes.

INDUS WATERS TREATY The partition of India resulted in the separation of the Indus River and its tributaries from their irrigation works. Negotiated by Tennessee Valley Authority director David Lilienthal in 1960, the Indus Waters Treaty provided for cooperation in building new works, reserving the eastern rivers for India and the western ones for Pakistan.

ISLAM The religion revealed to the Prophet Muhammad in the sixth century BCE. The followers of Islam believe in the Abrahamic tradition of Christianity and Judaism but believe these religions became corrupted over time. As a result, Allah (Jehovah, or God) sent the Archangel Gabriel to reveal God's final gospel to Muhammad. Islamic tenets include strict monotheism and loyalty to a supercommunity based on a shared religion.

JAINISM An indigenous religion in India based in part on the concept of ahimsa, or absolute nonviolence. Jains believe the soul is entrapped by karma, which is built up by the performance of bad deeds. Because Jainist tenets include the belief that all things animate and inanimate have souls, any violence done to an object produces more karma. Once one frees one's soul of this entrapment, one reaches extinction and nirvana.

JATAKA Tales of the earlier incarnations of the Buddha compiled during the two centuries after Buddha's death.

JINNAH, MUHAMMAD ALI (1876–1948) Leader of the Muslim League in 1930s and 1940s, Jinnah evolved from a moderate member of the Congress Party to the leader of a movement that demanded a separate nation for India's Muslims.

KALABAGH DAM Located in Pakistan, the Kalabagh has been the recent focus of controversy between several states within the country. In particular, Sind, Balochistan, and the Northwest Frontier Provinces believe the project favors the Punjab at the expense of other regions.

KALI Indian goddess, often associated with Indian exotica, such as thuggi.

KALIDAS (CA. 4TH–5TH CENTURY CE) The “Shakespeare” of classical India. His most famous work, *Shakuntala*, was influential in the transition of Hinduism, particularly in terms of karma yoga.

KALINGA ANICUT Built by King Dhatusena of Sri Lanka in the fifth century, this anicut was longer than three miles and produced a reservoir over seven square miles in area.

KANDY Kingdom in central Sri Lanka, conquered by the East India Company in 1815. Kandy became the central region for European coffee plantations during the colonial era.

KANTALAI TANK A reservoir in Sri Lanka that was the centerpiece of early irrigation. Built in the third century, the tank covered 4,560 feet, and included a 50-foot dam to contain the water.

KAPTAI DAM Located in the Chittagong Hill Tracts in the Bangladesh Delta, the construction of the dam was a catalyst for a separatist movement instigated by the Chakmas, an adivasi group indigenous to the region.

KARIKALA (CA. 1ST CENTURY CE) Chola king in the Deccan, who authorized the building of the Grand Anicut in the first century.

KHOSLA, A. N. (1892–1984) First chairman of the Central Water Irrigation and Navigation Committee, Khosla was the primary instigator of most of the large dam projects in India in the 1950s and 1960s.

KOIRALA, B. P. (1915–1982) Leader of the Nepali Congress Party and one of three brothers who became prime minister of Nepal.

KOSI AREA DEVELOPMENT PLAN OF 1954 One of the early agreements between India and Nepal, under which India would build a hydroelectric dam along the Kosi River in Nepal. The perception in Nepal that such plans would primarily benefit India led to a cooling of relations between the two countries.

KRISHNA This blue-skinned avatar of Vishnu is one of the most popular gods in the Hindu pantheon. Noted for his charm and courage, Krishna reveals the concepts of karma yoga and bhakti yoga to Arjuna in the Bhagavad Gita.

LAISSEZ-FAIRE A system of economics that argues for an absence of state interference in the marketplace. Adam Smith, its early advocate, argued that prices will correct themselves through supply and demand and that artificial interference hurts the natural order of capitalism.

LAND ACQUISITION ACT OF 1894 An outdated colonial regulation that called for cash payments to cultivators whose lands were acquired through eminent domain. Although the independent government of India promised land-for-land exchanges in the resettlement plans that were part of the large dam projects, in the case of the Narmada Valley Project, state governments often resorted to this act to subvert land exchanges.

LILIENTHAL, DAVID (1899–1981) Director of the Tennessee Valley Authority (TVA), Lilienthal was a strong advocate of exporting TVA-style projects throughout the world.

MACAULAY, THOMAS BABINGTON (1800–1859) As law minister for India in the 1830s, Macaulay's "Minute on Education" introduced the concept of the "brown Englishman," and led to the adoption of English as the language of government and higher education.

MADRAS IRRIGATION COMPANY Private company formed by Arthur Cotton in 1858 to control irrigation and transportation along the Tungbhabhadra River system. Although the Madras Irrigation Company guaranteed the Government of India a five percent return on its investment, it soon faced bankruptcy.

MAHABHARATA The great Hindu epic poem that tells the tale of two groups of cousins who end up battling for control of the kingdom of Bharat. The centerpiece of the *Mahabharata* is the Bhagavad Gita.

MAHAVIRA (CA. 599–527 BCE) The founder of Jainism, Mahavira was the last tirthankara ("ford crosser") to find nirvana.

MALTHUS, THOMAS (1766–1834) Professor of political economy at the East India Company College at Haileybury, who argued for population control. Malthus believed disease, war, and famine were natural occurrences that checked exponential population growth and should not, under most circumstances, be artificially contained.

MANUCCI, NICCOLAO (1639–1717) Venetian adventurer who spent most of his life in South Asia. His tales provide an early European glimpse of the Mughal Empire.

MAURYAN EMPIRE (CA. 324–185 BCE) First large empire in India. Under its greatest emperor, Ashoka, the empire's boundaries stretched from the Hindu Kush to the Chola kingdom south of the Krishna River.

MERCANTILISM An economic system in which a country's power and prestige were measured by its reserves of precious metals.

MILL, JAMES (1773–1836) One of the earliest and strongest supporters of utilitarianism, James Mill wrote a six-volume history of India in which the inhabitants were portrayed as cruel, backward, and urgently in need of British guidance.

MILL, JOHN STUART (1806–1873) Son of James Mill and the most famous of 19th-century utilitarians. Employed by the East India Company, as he rose through the ranks he became increasingly powerful, and his belief in utilitarianism had a direct effect on the administration of India.

MODI, NARENDRA (1950–) Chief minister of Gujarat since 2001, Modi has been the leader of a movement to discredit the Narmada Bachao Andolan.

MORAL ECONOMY OF THE PEASANT A system of reciprocity in which the peasant provides grain and corvee to the state in return for protection and food in times of famine. If the peasant believes the state or its representative is not living up to its moral obligation, he may rebel.

MORSE REPORT Common name for the report issued by the World Bank's independent review of the Narmada Valley Project. The report contained harsh criticism for both the project administrators and the World Bank itself.

MUGHAL EMPIRE (1526–1858) Founders of one of the greatest empires in the history of the world, between 1556 and 1707 the Mughals gained control of the bulk of the India subcontinent and Afghanistan. Their environmental effect on India was profound, involving agriculture, deforestation, water control, and the environmental degradation brought by almost constant warfare.

MUHAMMAD (570–632) The final prophet of Allah, to whom was revealed the Koran, which Muslims believe contains the final revelations of the Abrahamic religions.

MULTI-PURPOSE RIVER VALLEY DEVELOPMENT (MPRVD) Based on the Tennessee Valley Authority, these schemes in South Asia involved a series of large, hydroelectric dams in a given valley. The projects were intended to provide irrigation for the peasants of the region and electricity for large cities and corporations. Social engineering was often a factor in these projects as well. MPRVD projects involved massive resettlement of populations in the respective regions and had a negative impact on the ecosystems of the valleys.

MUSLIM LEAGUE Founded in 1906, the All-India Muslim League, under the leadership of Muhammad Ali Jinnah, would demand and receive two parts of a trifurcated Indian subcontinent, with West Pakistan cut from the northwest and East Pakistan (now Bangladesh) formed from East Bengal.

NADIR SHAH (1698–1747) Persian emperor who in 1739 sacked Delhi, taking the Peacock Throne back to Persia as bounty.

NARMADA BACHAO ANDOLAN (SAVE THE NARMADA MOVEMENT) Begun in the 1980s, the NBA, as it is known, is an attempt to save the Narmada Valley and its inhabitants from being inundated from a series of large multipurpose dams along the Narmada River. The movement, which has recently seen a series of disappointments, is nonetheless the most famous contemporary grassroots movement in the world today.

NARMADA VALLEY PROJECT (NVP) MPRVD project highlighted by the Sardar Sarovar Dam, whose construction was the impetus for the formation of the Narmada Bachao Andolan.

NARMADA WATER DISPUTE TRIBUNAL Formed in 1969 to settle disagreements among the states of Madhya Pradesh, Maharashtra, and Gujarat over the acre-footage each state would receive upon completion of the Narmada Valley Project. The tribunal's resolution in 1979 paved the way for the construction of the project.

NAXALITE MOVEMENT Maoist guerrilla movement in East India, which takes its name from the village of Naxalbari in West Bengal, where, in 1967, a group of landless laborers forcibly reclaimed crops from the land controllers.

NEHRU, JAWAHARLAL (1889–1964) Second only to Mahatma Gandhi in leadership of the Indian National Congress and India's independence movement, Nehru was the first prime minister of independent India, from 1947 until his death.

NEPALI NATIONAL CONGRESS Formed in 1947, the Nepali National Congress was a Nepali organization that worked for a democratic insurgency against the ruling elite.

NON-ALIGNED MOVEMENT (NAM) Formed by a group of formerly colonized countries during the cold war, the NAM advocated a path that put them in neither the Soviet camp nor the American one. Jawaharlal Nehru was one of the NAM's founders.

NON-COOPERATION MOVEMENT (1920–1922) Mahatma Gandhi's first major satyagraha, it evolved around the boycott of colonial goods and institutions. Gandhi suspended the movement when a group of satyagrahis murdered some 20 policemen who had physically abused them in the village of Chauri Chaura.

NON-GOVERNMENTAL ORGANIZATION (NGO) Privately funded organizations that are often involved in political and social movements.

ORIENTALISM In its colonial meaning, Orientalism referred to East India Company administrators who were sympathetic to Indian customs and traditions and urged the colonial government to build upon them. As defined by Edward Said, Orientalism referred to the scholarly tendency to look at Asians as "others," defined by who they were not (Europeans) rather than who they were.

PASTORALISM A form of agriculture based on animal husbandry rather than cropping.

PATKAR, MEDHA (1954–) Social activist who is credited with the formation of the Narmada Bachao Andolan.

PAX BRITANNICA Based on the vaunted Roman system, the British claimed that Pax Britannica would bring peace, justice, and security to all the peoples of India. It was the colonial government's main symbol to justify the subjugation of India.

PERMANENT SETTLEMENT OF 1793 This act changed the zamindars from rent collectors to lords of the land. Under colonial rule, as long as the zamindars paid the revenue at a price settled on by the government, they could not lose their lands. On the other hand, until 1885, the peasants of North India had no such rights. Furthermore, because the revenue settlement could not be changed, inflation made many zamindari families extraordinarily wealthy over time.

PHYSIOCRACY The philosophy that all true wealth lies in the land. Physiocrats urged the privatization of land throughout the world.

PIPAL TREE *Ficus religiosa*, the pipal is most famous as the type of tree under which Siddhartha Gautama found enlightenment and became the Buddha. The tree is often known as the Bodhi tree or the Tree of Enlightenment because of this event.

PRESIDENCY Term used by the East India Company for the three administrative units of direct Company control in India: Bombay, Madras, and Bengal. Each presidency was headed by a governor and was divided into provinces, divisions, and districts.

PRIMOGENITURE The practice of willing one's estate to the eldest male heir. Primogeniture's prime functions were to ensure that subinfeudation did not occur and to discourage fratricide.

PRITHVI NARAYAN SHAH (1723–1775) Gorkha ruler who became the founder of a unified kingdom of Nepal. In 1768 he was crowned king of Kathmandu.

PRIVATE FORESTS NATIONALIZATION ACT OF 1957 Legislation that nationalized private forests in Nepal. Among the unintended consequences was massive deforestation on the part of private owners in order to have their property classified as cultivable rather than forest land.

PROTOCAPITALISM Capitalism in its early stages, before the industrial revolution. Protocapitalism was usually local or regional and involved the sale of handicrafts for money.

PURUSHA The Hindu god from whose body the four varnas emerged.

RADCLIFFE, CYRIL (1899–1977) Radcliffe was assigned to draw the boundaries between India and Pakistan. He was chosen because he had never been to South Asia; this decision proved to be disastrous, for Radcliffe sat in his offices, drawing lines on maps of places he never visited. The resulting partition boundaries had enormous negative consequences for the people and environment of the Indian subcontinent.

RAM An avatar of Vishnu, Ram is the hero of the *Ramayana*.

RAMAYANA The other great Hindu epic, (besides the *Mahabharata*), the *Ramayana* tells the story of Ram and Sita, in the process emphasizing moral obligations such as dharma and karma.

RAMLILA The reenactment of the *Ramayana*, held across India annually.

RAVANA Demon god of Lanka in the *Ramayana*.

REBELLION OF 1848 Peasant insurrection against the planters and government in colonial Sri Lanka, which was ruthlessly suppressed by colonial troops.

ROWLATT COMMISSION Committee formed after World War I to review wartime restrictions on civil liberties. Rather than being rewarded for their loyalty during the war, as the Indian nation had expected, the subsequent Rowlatt Acts made the wartime legislation permanent. The acts were a major catalyst for the change from nationalism to a demand for independence by the Congress leadership.

ROY, ARUNDHATI (1961–) Booker Prize-winning author whose involvement in the Narmada Bachao Andolan brought the movement international attention.

SAGARMATHA NATIONAL PARK Himalayan park in Nepal that contains the region surrounding the southern portion of Mount Everest. The park has become a global tourist attraction, with all the environmental problems that accompany such a prominence.

SAL *Shorea robusta* is a valuable hardwood found in the Himalayan foothills and mountains.

SANGAM Early collection of Tamil literature.

SANSKRIT The dead language that was the basis for all Devanagari languages of North India; these include Hindi, Bengali, Punjabi, and other scripts.

SANTAL LAND ALIENATION REGULATION Enacted after the Santal Rebellion of 1855, the regulation protected Santal adivasis from foreclosure due to debt to moneylenders and zamindars. The regulation only applied to those Santals who lived in the Santal Parganas.

SARDAR SAROVAR PROJECT The centerpiece of the Narmada Valley MPRVD, the Sardar Sarovar Dam was the focus of the Narmada Bachao Andolan.

SEDENTARY AGRICULTURE The practice of settling in an area and farming the same plot of land perennially. It usually follows slash-and-burn cultivation, and its consequences include the arrival settlements, growth in population, and often overcropping, which depletes the nutrition from the soil.

SEN, AMARTYA (1933–) Nobel Prize-winning Indian economist who has argued that famine is not caused by the lack of food but by the lack of availability of food.

SEN, SUDHIR (1906–1989) Inaugural chairman of the Damodar Valley Project (DVP), who hoped to run the MPRVD as a corporate business venture. The DVP, however, soon became politicized.

SHAH JAHAN (1592–1666) Mughal emperor responsible for building the Peacock Throne and Red Fort in Delhi and the Taj Mahal in Agra. His profligate spending spelled the beginning of the end for the Mughal Empire.

SHERPA Tibeto-Nepalese ethnic group inhabiting the Mountain Region of Nepal. The Sherpas are best known as Himalayan guides.

SHER SHAH SURI (1486–1545) North Indian 16th-century ruler who formed the prototype of the Mughal and British agrarian and revenue systems. He also refurbished the Grand Trunk Road, adding numerous guesthouses, gardens, and resting areas.

SHIVA Hinduism has two major branches; the Saivites consider Shiva to be the supreme deity. Shiva has many different aspects; on the one hand he is Nataraj, the God of Dance, and on the other he is the Destroyer. He is also pictured on some icons as half male and half female, thus encompassing humanity. Shiva is a good example of how ultimately a monotheistic god incorporates many attributes of other iconic deities.

SHIVAJI (1627–1680) Leader of the Marathas, he proclaimed a new Hindu kingdom in the Deccan, forcing the Mughals, and after them the British, to spend decades attempting to conquer them.

SHUNGLU REPORT Named after the chairman of the Sardar Sarovar Project Relief and Rehabilitation Oversight Group, which in 2006 was commissioned to review multiple claims that resettlement operations were not being fully carried out in the Narmada Valley. The Shunglu Report claimed that there was no need to suspend Narmada Valley Dam construction; as a result, the dam neared completion in early 2007.

SIKHISM Syncretic religion founded in the Punjab in the 16th century. Sikhism evolved from a populist religious movement to a more militant identity, coinciding with Mughal persecution. Among Sikh rituals are the “5 Ks,” which include the wearing of a bracelet and a turban. As a result of being highly recognizable, Sikhs have been the focus of massacres in the 20th century in particular.

SITA Wife of the Hindu god Ram, Sita is a prominent figure in the *Ramayana*. She represents the virtues of womanhood in the story and exemplifies the sanctity of following one’s dharma.

SITALA Hindu goddess associated with smallpox.

SLASH AND BURN One of the earliest forms of cultivations. Often a form of shifting agriculture, it involves burning forests or grasslands, allowing the ashes to fertilize the soil, and then using that land as pasturage or for farming.

SMITH, ADAM (1723–1790) The father of modern capitalism, Smith ardently advocated free trade, which eventually led to the East India Company losing

most of its monopolies in India. His belief in laissez-faire economics was widely accepted throughout Europe and North America.

SOCIAL DARWINISM The belief that Darwin's theory of "survival of the fittest" applies to nations and societies as well as species. In the late 19th and early 20th centuries social Darwinism became a legitimizing factor for colonialism.

SUBINFEUDATION The practice of dividing an estate between all male heirs, thus subdividing an estate into many small sections over several generations.

SUNDRI *Heritiera fomes*, the sundri is the primary tree found in the mangroves of the Sunderbans in India and Bangladesh.

SURVEY AND SETTLEMENT OPERATIONS Established as result of the Permanent Settlement, East India Company revenue officers were sent to the mofussil to survey the value of the land and settle the revenue amount with the zamindars.

SWADESHI MOVEMENT Literally, "our country," the swadeshi movement arose as a response to the partition of Bengal in 1905. Swadeshi leaders urged a boycott of all British goods. The movement became popular enough to have a negative effect on the colonial economy.

SWIDDEN A form of slash-and-burn agriculture.

TAGORE, RABINDRANATH (1861–1941) Nobel Prize-winning poet laureate of India, Tagore was the subcontinent's most famous intellectual during the independence movement. He disagreed with Gandhi's belief that independent India should return to a premodern village society.

TAMIL TIGERS Guerrilla organization in Sri Lanka that uses militant techniques to try to force the government to agree to a separate Tamil state in the north.

TAMIL UNITED LIBERATION FRONT (TULF) Organization of Sri Lankan Tamils. Unlike earlier Tamil movements, which demanded equal treatment for the Tamil population of Sri Lanka, TULF evolved into a separatist movement, demanding its own state in the northern section of the island.

TAYLOR, ALEX (1826–1912) Second president of Coopers Hill College, Sir Alex Taylor introduced the concept of "grit" to the college, arguing that attitude and esprit de corps were more important for the Royal Indian Engineers than training or knowledge of the South Asian terrain.

TEAK *Tectona*, teak is perhaps the most valuable hardwood in the world. It is found throughout the monsoon belts of India, Sri Lanka, and Burma, and during the colonial era it was extremely popular as a building material.

TECTONIC PLATES The planet's land masses are made of solid rock, called plates. These are constantly moving at a speed of less than an inch per year.

The tectonic plates form the continents, islands, and subcontinents and will continue to change the shape of earth's land masses as long as the planet exists.

TEMPLE, RICHARD (1826–1902) The late 19th-century famine commissioner who was notorious for his Spartan response to famines in South Asia. "Temple wages," as the food stipends Temple approved for the afflicted were caustically called, supposedly had less nutritional value than the food provided to prisoners at Auschwitz.

TENNESSEE VALLEY AUTHORITY (TVA) The first multipurpose river valley development scheme, the TVA built a series of dams that provided electricity and irrigation in the southern United States during the Great Depression. Its success (which has since been questioned) led to the TVA becoming the model for large-dam projects across India.

THOMASON CIVIL ENGINEERING COLLEGE Located at Roorkee, in the United Provinces, Thomason's was the most esteemed engineering college in India.

TRANSMIGRATION The movement of the soul from one lifetime to the next.

TREVELYAN, CHARLES (1807–1886) Son-in-law of Macaulay and governor of Madras after the 1857 Rebellion, Trevelyan had been in charge of Irish famine relief during the Great Famine of the 1840s. He advocated using a similar system of relief in India, regardless of different environments and circumstances.

TSUNAMI Large waves formed by underwater earthquakes.

UTILITARIANISM Philosophy based on the concept that society should be run for the greatest good for the greatest number of people. Utilitarianism had a profound effect on 19th-century environmental history in South Asia.

VALVE PIT First invented in Sri Lanka in the third century BCE, a valve pit regulates the flow of water through an irrigation system.

VARIOLATION An early form of inoculation, which involves introducing the live smallpox virus into a healthy body.

VARUNA Hindu god of the cosmic order.

VEDAS The early collections of the Hindu sacred texts, passed orally from one generation of brahmans to the next. The Vedas are the foundation of Hinduism.

VIJAYANAGAR A kingdom in South India from the 14th through mid-16th centuries. The rulers' use of Hindu symbolism helped to provide unity against Muslim conquerors from the north.

VISHNU The supreme deity of the Vaishnavites. Vishnu has 10 avatars, or incarnations, among them the gods Krishna and Ram. These avatars of

Krishna have appeared in human form during times of crisis in Indian history.

VOORDUIN, WILLIAM (1897–1977) In 1943, Voorduin was dispatched from the TVA to advise Nehru on large dam projects. As planner of the Damodar Valley Project, he had no knowledge of the local environment or local practices in the Damodar Valley.

WILLCOCKS, WILLIAM (1852–1932) One of the most prominent engineers in the history of the British Empire, Willcocks was educated at Roorkee in India. He was convinced that local knowledge was crucial for building public works in Bengal.

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CHRONOLOGY

- CA. 500 MILLION BCE** Formation of Gondwana, one of two supercontinents, which includes the Indian peninsula.
- CA. 180 MILLION BCE** Gondwana splits in two, with the eastern portion including India, Australia, and Antarctica.
- CA. 50 MILLION BCE** India collides with Eurasia, forming the Himalaya Mountains.
- CA. 7000 BCE** Formation of Mehrgarh in Balochistan. This agricultural and pastoral community was the predecessor to the Indus Valley Civilization.
- CA. 2600 BCE** Formation of the Indus Valley Civilization.
- CA. 2500 BCE** Ajanta Caves rock carvings created.
- CA. 2000 BCE** Aryan migration to South Asia begins.
- CA. 1750 BCE** Destruction of the Indus Valley Civilization, in part due to environmental factors.
- CA. 1000 BCE** Earliest of the Vedic texts completed.
- CA. 1000 BCE** Settlements form across the Gangetic plain. The caste system emerges.
- 599 BCE** Birth of Vardhamana Mahavira, the founder of Jainism.
- 563 BCE** Birth of Siddhartha Gautama, the founder of Buddhism.
- 5TH CENTURY BCE** Large-scale irrigation works begin in Sri Lanka.
- 326 BCE** Alexander the Great invades India.
- 321 BCE** Formation of the Mauryan Empire.
- 273–232 BCE** Reign of Emperor Ashoka.
- CA. 120 BCE** King Karikala of Chola commissions the construction of the Grand Anicut along the Cauvery River.
- 274–302** Reign of King Mahasen, who commissioned the building of the Kantalai Tank in Sri Lanka.
- 320–550** Dynastic rule of the Gupta Empire.
- 570** Birth of Muhammad, the Prophet of Islam.
- 711** First extensive Islamic incursion into South Asia.
- 1175** Muhammad Ghuri begins his conquest of North India, with his armies ranging as far as Bihar in the northeast.

- 1206** Formation of the Delhi Sultanate.
- CA. 1200** Beginning of five centuries of mass migration into South Asia, in response to Genghis Khan's wars in West Asia and East Europe.
- 1336** Kingdom of Vijayanagar proclaimed in South India by the brothers Harihara and Bukka.
- 1396** Massive famine begins in the Deccan.
- 1398** Timur sacks Delhi.
- 1469** Birth of Guru Nanak, founder of Sikhism.
- 1498** Vasco da Gama reaches India, landing at Calicut, one of the great cosmopolitan trading centers in South India. He returns to Europe with a shipload of spices, instigating the economic competition for India's riches.
- 1510** The Portuguese capture the island of Goa.
- 1526** Formation of the Mughal Empire by Babur, who dies in 1530.
- 1530–1556** Reign of Emperor Humayun, interrupted when he was forced to flee to Persia after a defeat by Sher Shah Suri.
- 1540–1545** Reign of Sher Shah Suri in North India. Sher Shah was a famous patron of public works, and his reforms paved the way for the administrative structure of the Mughals and the British.
- 1556–1605** Reign of Akbar, the greatest Mughal emperor, and instigator of the Mansabdari System.
- 1571** Akbar commissions the building of Fatehpur-Sikri as the new capital of India.
- CA. 1575** Akbar introduces the Mansabdari System.
- 1585** Fatehpur-Sikri abandoned, in part due to the loss of a source of water caused by the movement of the Jamuna River.
- 1595** Akbar revises the Mansabdari System, introducing the concepts of zat and suwar.
- 1605–1628** Reign of the Mughal Emperor Jahangir
- 1615** Indian Medical Service established by the East India Company.
- 1627** Birth of Shivaji Bhonsle, who led the Marathas in revolt against the Mughal Empire.
- 1628–1658** Reign of Shah Jahan, who oversaw the height of opulence of the Mughal Empire.
- 1631** The Taj Mahal commissioned by Shah Jahan.
- 1641** The British East India Company factory at Madras is founded by Francis Day.
- 1658–1707** Reign of Aurangzeb, the last of the great Mughal emperors.
- 1680–1707** Aurangzeb wages the Deccan Wars against the Marathas, resulting in serious environmental damage to South India. The emperor died without resolving his battles against the Marathas.

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- 1690** The East India Company is given Mughal permission to establish a factory at Calcutta.
- 1702** Famine in the Deccan results in 2 million deaths.
- 1724** Nizam ul-Mulk forms the Asif Jahi dynasty, which ruled the princely state of Hyderabad until 1948. His example leads to the formation of autonomous states throughout the declining Mughal Empire.
- 1725** Birth of Robert Clive, symbolic founder of the British Empire in India.
- 1739** Nadir Shah sacks Delhi, taking the Peacock Throne back to Persia with him.
- 1740** Alivardi Khan recognized as Nawab of autonomous Bengal by the Mughal Empire.
- 1752** Clive and the British East India Company forces defeat the Nawab of Arcot, whose forces were backed by the French East India Company. The victory marked the rise of the British and the decline of the French in South India.
- 1757** At the Battle of Plassey Clive defeats the forces of the Nawab of Bengal, Siraj-ud-daula, resulting in the East India Company conquest of Bengal.
- 1764** The Battle of Buxar results in the defeat of the united remnants of Mughal forces. In return for a sizable pension, the Mughal emperor grants the East India Company revenue rights to Bengal in perpetuity. The East India Company thus was officially recognized as an equal autonomous state within the Mughal Empire.
- 1768** Prithvi Narayan Shah unifies Nepal.
- 1770** Bengal famine causes the death of 10 million.
- 1774** Warren Hastings is appointed the first Governor General of the East India Company in India.
- 1775–1818** A series of wars with the Marathas results in the East India Company becoming the primary power in India.
- 1786** Lord Cornwallis, author of the Cornwallis Code, is appointed Governor General.
- 1793** The Permanent Settlement Act is enacted in the Bengal Presidency.
- 1802** Ceylon becomes the first Crown Colony within the British Empire.
- 1805** The subsidiary alliance system for princely states is introduced by Richard Wellesley.
- 1806** The East India Training College at Haileybury opens its doors.
- 1807** Francis Hamilton Buchanan is appointed by the colonial government to carry out a statistical tour of Bengal. His reports, which recommend commodifying the area, played a fundamental role in changing the entire landscape of the region.

- 1813 Charter Act limits the monopolies of the East India Company. The Act also opens the subcontinent to missionary activities.
- 1814–1816 Anglos Nepali War.
- 1815 The kingdom of Kandy in Ceylon is conquered by colonial troops.
- 1820s The Raiyatwari System is instituted in the Bengal Presidency.
- 1828 Lord William Bentinck, the cheerleader for utilitarianism in India, is appointed Governor General.
- 1829 Sati outlawed in the Bengal Presidency.
- 1833 Another Charter Act abolishes all Company monopolies except those on opium and salt.
- 1833 Colebrooke-Cameron Reforms introduced in Sri Lanka.
- 1835 Thomas Babington Macaulay delivers his “Minute on Education.”
- 1839 Arthur Cotton begins reconstruction of the Grand Anicut on the Cauvery River.
- 1839 William Henry Sleeman becomes Commissioner for the Suppression of Thuggi and Dacoity.
- 1843 Construction begins on the Ganges Canal, the first original irrigation scheme in colonial India.
- 1845 Rana oligarchy grabs political power in Nepal.
- 1847 Establishment of the Thomasson College of Engineering at Roorkee.
- 1848 Ordinances enacted in Ceylon ease taxes on planters, instead putting the burden on cultivators. In addition, Ordinance 12 transfers all forest lands to the state. As a result of the ordinances, rebellion breaks out in Kandy later that year.
- 1850–1900 Over 25,000 miles of railway track are laid in half a century.
- 1854 The Government of India creates the Public Works Department.
- 1855 The Santal Rebellion against the colonial government results in the death of more than 10,000 people.
- 1857 Rebellion breaks out in the military, and soon spreads across North India.
- 1858 Indian rebellion ends. Results of the insurrection include the abolition of the Mughal dynasty, and the transfer of power from the East India Company to the British crown.
- 1858 Madras Irrigation Company formed by Arthur Cotton, followed shortly by the East India Irrigation and Canal Company. These attempts at privatizing irrigation and flood control ended in ignominy.
- 1865 Orissa famine commences, resulting in one million casualties.
- 1867 The Indian Forest Service is constituted.
- 1869 Opening of the Suez Canal shortens the distance from London to Bombay by more than 4,500 nautical miles.

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- 1869 Fungus devastates the coffee crop in Kandy, eventually leading to the end of coffee plantations in Sri Lanka.
- 1869 Birth of Mohandas Karamchand Gandhi
- 1871 Criminal Tribes Act is introduced.
- 1877 Queen Elizabeth is proclaimed Empress of India.
- 1878 The Indian Forest Act leads to complete state intervention into the usage and regulation of the subcontinent's forests.
- 1884 Ilbert Bill controversy.
- 1885 Birth of the Indian National Congress.
- 1885 The Bengal Tenancy Act grants occupancy rights to any raiyat who can provide proof that he has cultivated the same plot of land for twelve consecutive years.
- 1889 Birth of Jawaharlal Nehru.
- 1894 The Land Acquisition Act, which calls for a strict cash-for-land payment when eminent domain is used to confiscate a cultivator's land, becomes law. A century later this act will be used to abrogate agreements that guarantee new, cultivable land for those peasants whose farms are flooded by new hydroelectric dams.
- 1899 Lord Curzon, the most hated ruler in the history of colonial India, is appointed Viceroy.
- 1905 Bengal is partitioned into two separate provinces.
- 1906 All-India Muslim League is formed.
- 1911 Bengal reunited, but the capitol of India is moved from Calcutta to Delhi.
- 1914 World War I begins.
- 1918 Outbreak of influenza kills more than 12 million in South Asia.
- 1918 With the end of World War I, the Government of India forms the Rowlatt Commission to suggest changes to the Defence of India Act. The subsequent harsh recommendations lead to protests across India.
- 1919 The Amritsar Massacre changes the face of the Indian Independence Movement.
- 1919 The Government of India Act of 1919 introduced the concept of "dyarchy," in which specific ministries were put under the administrative control of provincial assemblies.
- 1920 Gandhi begins his first major satyagraha campaign, the Non-Cooperation Movement.
- 1930 The last major colonial irrigation scheme, the Sarda Canal, is completed.
- 1930 Gandhi begins the Civil Disobedience Movement with the Salt March. The Mahatma walks some 240 miles to the sea in order to make his own

salt, in the process purposefully breaking the law. The movement is suspended with the Gandhi-Irwin Pact, which calls for the Mahatma to attend a Round Table Conference in London.

1932 Earthquake in Bihar kills more than ten thousand people.

1935 The Government of India Act of 1935 resulted in the introduction of direct elections to determine autonomous governance in each province.

1939 Word War II begins.

1942 Gandhi carries out his final satyagraha campaign, the "Quit India" Movement.

1942 Subhas Chandra Bose organizes the Indian National Army (INA) out of the 60,000 Indian soldiers abandoned by the British when they escaped from Singapore. The INA fought alongside the Japanese, but soon realized that they were treated no better by the Japanese than they had been by the British.

1943 Famine in Bengal kills over 3 million.

1945 The Orissa Multipurpose River Conference recommends the construction of the Hirakud Dam.

1946 The Cabinet Mission Plan offers the last hope for a united independent India. With the plan's rejection, partition becomes inevitable.

1946 The Narmada Valley Project is first considered by the Central Waterways Irrigation and Navigation Committee.

1947 Lord Mountbatten is appointed as the last Viceroy of India.

1947 Indian and Pakistan become independent nations.

1948 Ceylon gains its independence.

1948 Mohandas K. Gandhi is assassinated.

1948 The new Indian parliament approves the Damodar Valley Project, to be based on the multi-dam project of the Tennessee Valley Authority in the United States.

1949 Zamindari Abolition Acts are introduced in state legislatures across North India.

1953 Tenzing Norgay and Edmund Hillary become the first humans to climb Mount Everest.

1953 The controversial Kalabagh Dam Project in Pakistan is initiated.

1954 Nepal and India agree to the Kosi Area Development Plan.

1954 Medha Patkar is born.

1957 Private Forests Nationalization Act introduced in Nepal.

1959 India-Nepal project to harness the Gandak River causes anger in Nepal over the perceived inequities in sharing the benefits from the plan.

1960 Indus Water Treaty signed by India and Pakistan.

1962 The Kaptai Dam in the Chittagong Hills of East Pakistan is completed.

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- 1963** Nehru dedicates the Bhakra dam, referring to it as an example of the “new temples of resurgent India.”
- 1967** Peasant insurrection against landlords in Naxalbari, West Bengal, leads to the formation of the Naxalite Movement.
- 1970** Cyclone kills half a million people in East Pakistan (soon to be Bangladesh).
- 1971** East Pakistan becomes the independent nation of Bangladesh.
- 1972** Ceylon changes its name to Sri Lanka.
- 1972** Formation of the Tamil United Liberation Front (TULF), which demands an autonomous or independent state for the Tamils of Sri Lanka.
- 1974** The Chipko Movement gains international attention.
- 1976** Sagarmatha National Park opens at the base of Mount Everest.
- 1979** The Narmada Water Dispute Tribunal finally settles the contentions among the various states through which the river flows, paving the way for the construction of the Sardar Sarovar Dam.
- 1983** Guerilla warfare by the Tamil separatists begins across Sri Lanka.
- 1984** During Operation Bluestar, the Indian Army’s confrontation with Sikh separatists results in the invasion of the Golden Temple in Amritsar, the Sikhs’ holiest temple and shrine. Four months later Indian Prime Minister Indira Gandhi is assassinated by her Sikh bodyguards.
- 1984** Leakage from a Union Carbide chemical plant in Bhopal, India, develops into a poisonous cloud that immediately kills many thousands of people. The effects of the disaster may last for generations.
- 1987** Under the leadership of Medha Patkar, several organizations protesting the Sardar Sarovar Dam join together to form the umbrella organization Narmada Bachao Andolan.
- 1990** Rajiv Gandhi, former prime minister of India, is assassinated while campaigning for a return to office.
- 1993** The World Bank withdraws support and funding from the Sardar Sarovar Dam.
- 1995** In response to significant protest in Nepal and elsewhere, the World Bank withdraws its support for the Arun III Hydraulic Project.
- 1999** Cyclone kills more than 10 thousand people in the Indian state of Orissa.
- 2001** Earthquake in the Indian state of Gujarat takes more than 20 thousand lives.
- 2004** Tsunami hits Sri Lanka and India, killing 35,000 on the island nation and 11 thousand on the subcontinent.
- 2005** Kashmiri earthquake in India and Pakistan kills over 73 thousand people.

- 2006** The report of the government-appointed Shunglu Committee claims that the rehabilitation and resettlement of people displaced by the Narmada Valley Project is progressing successfully. This conclusion allows the construction of the Sardar Sarovar Dam to continue unabated.
- 2007** Gujarat Chief Minister Narendra Modi announces that the Sardar Sarovar Dam has been effectively completed.
- 2007** After sixteen years of deliberation, the Cauvery Water Dispute Tribunal divides the waters of the Cauvery River between four Indian states and territories, to the satisfaction of none of the parties involved.
- 2007** Cyclone Sidr hits Bangladesh, resulting in about 3,500 deaths. The relatively low death toll is credited to the early warning system installed by the Bangladeshi government after a tropical storm in 1991.
- 2007** Benazir Bhutto, former Prime Minister of Pakistan, is assassinated while campaigning for elections.
- 2007** Parliament abolishes the monarchy in Nepal.
- 2008** As a result of guerilla attacks in late 2007, the Sri Lankan government abrogates a ceasefire with the Tamil Tigers.
- 2008** Elections for a constituent assembly in Nepal are set for April 10.

BIBLIOGRAPHIC ESSAY

Unless otherwise noted, complete citations for these sources can be found in the Bibliography.

INTRODUCTION

Because the field of environmental history is relatively young, it would perhaps be best to begin with some historiographic essays and general collections of articles. The most convenient method to get a sense of the various ways in which environmental history is written is to read a few articles from *Environmental History* and *Environment and History*, the two general journals in the field. The journals are published in the United States and the United Kingdom, respectively. For South Asia specifically, the *Journal of South Asian Environmental History*, which should appear in 2008, will be the first to address the subcontinent specifically.

Among collections of essays, the first volume specifically devoted to the field, *Nature, Culture and Imperialism*, edited by David Arnold and Ramachandra Guha (Delhi, Oxford University Press, 1995), contains one of the best introductions to environmental history in South Asia. The essays in the volume cover several different aspects of the discipline and are of great use. Other valuable collections include *Nature and the Orient*, edited by Richard Grove, et al. (Delhi: Oxford University Press, 2000), and Ranjan Chakrabarti's edited volume *Situating Environmental History* (Delhi: Manohar Press, 2007).

Finally, the 11 volumes of the *Subaltern Studies* series contain some of the best essays the field has produced over the past 25 years. Essays by Arnold, Chakrabarty, and Hardiman, among others, deal with disease, famine, urban environmental history, dams, and much more. Many of these articles were models for some of the best contemporary work in the field, when South Asian environmental history was just a fledgling.

CHAPTER 1

There are, unfortunately, no texts on subcontinental environmental history. Gadgil and Guha's *This Fissured Land* (1992) is a fine theoretical volume dealing with the processes that instigated environmental change in India, but it presumes a fundamental knowledge of Indian society and environment. As such we need to turn to basic geography and history texts for this background. The two most important sources for our purposes are Bernard S. Cohn, *India: The Social Anthropology of A Civilization* (Oxford: Oxford University Press, 2001, reprint), and Joseph Schwartzberg, et al., eds., *A Historical Atlas of South Asia* (Chicago: Chicago University Press, 1979). Cohn's survey is the closest we have to a true environmental history of the Indian subcontinent. Cohn was trained as a cultural anthropologist but combined his local anthropological research with his interest in South Asian history. In the process he became a giant in the field, transforming the manner in which history is considered. In terms of dovetailing historical changes with the visible impact on the ground, *A Historical Atlas of South Asia*, is a masterpiece with no equal. O. H. K. Spate's *India and Pakistan: A General and Regional Geography* (Columbia, MO: South Asia Books, 1984, reprint) provides an excellent basic geography of the region; Ashok K. Dutt's more recent *Atlas of South Asia* (Boulder, CO: Westview, 1987) provides a decent, if somewhat superficial, overview of the subcontinent as well.

Historical texts of the subcontinent were, until the past decade or so, rather sparse, but there are now quite a few to choose from. Perhaps the most popular text, now in its seventh edition, is Wolpert's *A New History of India* (2004). Written with no expectations that the reader has a background in South Asian history, it is a standard but lively account of the political history of the subcontinent. Other strong texts in this genre include *A History of India* by Hermann Kulke and Dietmar Rothermund (Delhi: Manohar, 1987), which is particularly strong on ancient and medieval history, and Burton Stein's *A History of India* (1998). Two newer books that try to move away from the political model are Peter Robb's *A History of India* (2002) and David Ludden's *India and South Asia: A Short History* (2002). Both deal with issues outside the general framework of political history and make important contributions to the environmental history of the region.

In terms of cultural geography, we must again turn to the influential work of Bernard Cohn, in particular his collected articles in *An Anthropologist among the Historians and Other Essays* (1987). Essay 6 was widely used in Chapter 1, and Essays 1, 2, 3, 16, 20, and 23 are also important to the study of South Asia. Another useful collection is *Land Control and Social Structure in Indian History*,

edited by Robert E. Frykenberg; in this volume, Walter Neale's essay "Land is to Rule" is particularly perceptive (Madison: University of Wisconsin Press, 1969). An early collection of relevant essays, edited by Robert I. Crane, is *Regions and Regionalism in South Asian Studies* (Duke: Duke University Press, 1966). Of more recent vintage is the volume edited by Saraswati Raju, et al., entitled *Colonial and Post-Colonial Geographies of India* (New Delhi: Sage Publications, 2006). Although a bit dense at times, many of the essays provide contemporary views of urban and rural cultural geographies.

Finally, we do not have to look far for the best general sources on prehistory and ancient history. The works of Bridget and Raymond Allchin (1968), A. L. Basham (1959), and Romila Thapar (1966, 1997, 2002), all cited in the bibliography, are to be found on any list of the best surveys of those early millennia.

CHAPTER 2

The best sources for the Indus civilization are much the same as those for prehistory. The volumes by Basham and Thapar still provide the best overview of the era; Thapar's *Early India* (2002) is particularly astute concerning the relationship between early societies and their environments. For a recent interpretation of the period, see *The Indus Valley: A Contemporary Perspective* by Gregory L. Possehl (Walnut Creek, CA: AltaMira Press, 2003).

For a background in the Vedic religions, see Sarvapelli Radakrishnan and Charles A. Moore, *A Sourcebook in Indian Philosophy* (Princeton, NJ: Princeton University Press, 1957), and the traditional Sanskrit stories translated by Wendy Doniger in *Hindu Myths: A Sourcebook* (New York: Penguin Classics, 2004). A new collection of essays edited by Christopher Key Chapple and Mary Evelyn Tucker, entitled *Hinduism and Ecology: The Intersection of Earth, Sky and Water* (New Delhi: Oxford University Press, 2000), contains more than a half dozen essays on traditional Hindu views of nature. Finally, essays in *Asian Perspectives of Nature*, edited by Ole Bruun and Arne Kalland (London: Curzon Press, 1995), deal with nature and spirituality in Nepal and Sri Lanka.

Any of Burton Stein's work on South India is highly recommended. Aside from his books noted in the bibliography, the volume he edited, *Essays on South India* (Honolulu: University of Hawaii Press, 1975), has some relevant articles. Finally, T. M. Srinivasan's work on irrigation in ancient and medieval South India (1991) is crucial to our knowledge of the environmental history of the Deccan and the peninsula.

CHAPTER 3

One of the best sources on Buddhism and Jainism is *A Sourcebook in Indian Philosophy*, cited previously. Another is *Sources in Indian Tradition*, Vol. 1 (New York: Columbia University Press, 1958), edited by Ainslie Embree. The essays on Hinduism, Buddhism, Jainism, and Ashoka found in A. L. Basham's edited volume *A Cultural History of India* (Oxford: Clarendon Press, 1975), provide brief but solid introductions to the various religions. Thapar's *Asoka and the Decline of the Mauryans* (1997) deals in part with the emperor's view of nature and environment, as does B. G. Gokhale's *Asoka Maurya* (1966).

For the classical period and the rise of the caste system in particular, see Morton Klass, *Caste*. Louis Dumont's classic study, *Homo Hierarchicus: The Caste System and Its Implications* (Chicago: University of Chicago Press, 1980), is a dense but important repositioning of caste theory. A provocative environmental view of caste development can be found in Gadgil and Guha, *This Fissured Land* (1992).

Most general texts will briefly cover early irrigation in Indian and Sri Lanka, but Stein's, Robb's, and Ludden's are more thorough. Srinivasan's *Irrigation and Water Supply: South India, 200 BC–1600 AD* (1991) is arguably the most useful monograph on the issue. Colonial studies from the last century of empire, such as Wilson's *Irrigation in India* (1903) and Deakin's *Irrigated India* (1893), although imbued with imperial rhetoric, at times provide keen perspectives on early irrigation. R. L. Brohier's *Ancient Irrigation Works in Ceylon* (1934) is a good place to start researching the early works in Sri Lanka.

CHAPTER 4

The medieval period begins to provide works that deal specifically with environmental history. Foremost among these is Sumit Guha's *Environment and Ethnicity in India, 1200–1991* (1999), which deals with such issues as the effect of war on the forest environment, the problems faced by forest states, and, important to later studies, the impact of colonial ethnography on views of Indian "races." Another important volume, albeit in a different arena, is Richard Eaton's *The Rise of Islam and the Bengal Frontier, 1204–1760* (1993), which deals with ecological change in East Bengal. John Richards' *The Unending Frontier: An Environmental History of the Early Modern World* (2003) also covers changes in medieval Bengal admirably. David Ludden's *Peasant History in South India* (1985) offers important detail on human geography in the south during this period.

In terms of Islam and nature, along with Atiya and Irshaad Hussain's article listed in the bibliography, see the essays in the volume edited by A. R. Agwan, entitled *Islam and the Environment* (New Delhi: Institute of Objective Studies, 1997), as well as those in *Islam and Ecology: A Bestowed Trust*, edited by Richard C. Foltz et al. (Cambridge, MA: Harvard University Press, 2003).

Finally, I must recommend a volume that has yet to appear. The collection of essays presented at a conference entitled "Fragrance, Symmetry and Light: The History of Gardens and Garden Culture in the Deccan," held at Hyderabad Central University in 2007, covers vast areas of environmental history, including irrigation, views of nature, medieval societies' interactions with their surroundings, and much more. The essays are scheduled to be published in the near future. Check the Web site of the School of Oriental and African Studies for publication details.

CHAPTER 5 AND CASE STUDY A

Not only was the late John F. Richards the esteemed expert on Mughal India, he was one of the founding fathers of South Asian environmental history in the United States. All of his work listed in the bibliography is pertinent to our study. With the important exception of Chetan Singh's work, there are few monographs whose stated purpose is to provide an environmental history of the Mughal era. There are, however, many valuable studies that detail the relationship between nature and Mughal society. Sumit Guha's volume mentioned earlier provides an excellent example, as does Richard Eaton's *Rise of Islam and the Bengal Frontier* (1993). Both deal in part with Mughal action—the first detailing warfare, the second agriculture—and the influence of that action on the people and landscape in Mughal India. J. L. L. Gommans' *Mughal Warfare: Indian Frontiers and High-roads to Empire, 1500–1700* (London: Routledge, 2002) devotes its first section to the Mughal environment to familiarize the reader with the changes about to occur.

Other studies provide glimpses into the environmental history of the Mughal era. Judith Roberts's work, for example, tells us a great deal about Mughal gardens, as does James Wescoat's *Mughal Gardens* (Cambridge, MA: Harvard University Press, 1999). These in turn suggest advances in irrigation, which dovetail nicely with Richards's and Eaton's work on agrarian changes across the empire. Khalidi's (forthcoming) and Inden's (forthcoming) essays on Deccan gardens are enormously valuable indicators of the empire's views of the sanctity of nature, while *Fatehpur Sikri*, edited by Michael Brand and Glenn D. Lowry

(Bombay: Marg Publications, 1987), provides insights into issues of space and distance, both of which are of interest to environmental historians.

For more on the history of the Sikhs, see Khushwant Singh's massive, two-volume *A History of the Sikhs* (New Delhi: Oxford University Press, 2005, reprint). For a very brief history see W. H. McLeod's essay on Sikhism noted in the bibliography (1975) or his more detailed study, simply entitled *Sikhism* (Chicago: University of Chicago Press, 1984). The volumes on Asian religions and views of nature that have been mentioned earlier are also noteworthy.

The Mughal agrarian system, which is the subject of Case Study A, relies primarily on the work of the three preeminent historians of the era: Richards, Eaton, and Irfan Habib, whose *The Agrarian System of Mughal India, 1526–1707* (New Delhi: Oxford University Press, 2001, reprint) remains the classic work on this subject well over 40 years after its original publication. Other studies that are useful include Ludden's *An Agrarian History of South Asia* (1999), *The Formation of the Mughal Empire* by Douglas Streusand (New Delhi: Oxford University Press, 1996), and the updated version of M. Athar Ali's *The Mughal Nobility under Aurangzeb* (New Delhi: Oxford University Press, 2002).

For the transitional period between the Mughals and the East India Company, see Richard B. Barnett's work, which is increasingly concerned with the environmental history of the 18th century. His *North India Between Empires: Awadh, the Mughals, and the British, 1720–1801* (Berkeley: University of California Press, 1980) provides a comprehensive look at the rise and impact of regionalism at the end of the Mughal era. He is currently writing a companion volume on South India between empires, and his essay (1994) noted in the bibliography provides a nice example of the rich possibilities for research on the effect of regionalism on the environment. C. A. Bayly's first four monographs are multifaceted studies of enterprise in the late Mughal–early East India Company period. All of them provide useful vignettes of the changes in society and, as a consequence, the landscape. Maya Jasanoff's wonderful read, *Edge of Empire: Lives, Culture, and Conquest in the East, 1750–1850* (New York: Vintage Books, 2005) details in part the experiences of the early European adventurers as they encountered the “wilds” of India. Finally, the brilliant essay, *A Rule of Property for Bengal*, by Ranajit Guha (1963), details the philosophical underpinnings of land settlements in the very first days of British control in Bengal; it should be required reading for anyone interested in European changes to the land.

CHAPTER 6 AND CASE STUDY B

The colonial period has generated many more environmental histories covering dispersed regions and issues. From this period to the present, there are

many more worthy monographs than can be included in this essay. The sources that follow are suggested places to start but are by no means exhaustive. Because the overall theme of this chapter was the impact of utilitarianism, science, and technology on the environment and society of early colonial India, the general sources for this chapter are crucial. In particular, Eric Stokes's *The English Utilitarians and India* (1959), Thomas Metcalf's *Ideologies of the Raj* (1994), and Frances Hutchins' *The Illusion of Permanence: British Imperialism in India* (Princeton: Princeton University Press, 1967) shed light on the utilitarian validation of empire. The main source for scientific validation is Michael Adas's *Machines as the Measure of Men* (1989), but Daniel Headrick's *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century* (Oxford: Oxford University Press, 1981) and *The Tentacles of Progress: Technology Transfer in the Age of Imperialism, 1850–1940* (Oxford: Oxford University Press, 1988) are useful as well. See also the collection edited by Roy McLeod and Deepak Kumar, entitled *Technology and the Raj: Western Technology and Technical Transfers to India 1700–1947* (New Delhi: Sage Publications, 1995).

For the section on changes in the land, see Walter Neale's essay mentioned previously, and Anand A. Yang's *The Limited Raj* (1989). Peter Robb is particularly astute at examining the evolution of land revenue policy from the Permanent Settlement to the Bengal Tenancy Act in his *Ancient Rights and Future Comforts* (1997). The role of botanists, ethnographers, and geographers in determining changes in the environment are detailed in several books, including Richard Grove's *Green Imperialism* (1996), David Arnold's *The Tropics and the Traveling Gaze: India, Landscape, and Science, 1800–1856* (Delhi: Permanent Black, 2005), Matthew H. Edney's *Mapping an Empire: The Geographical Construction of British India, 1765–1843* (Oxford: Oxford University Press, 1997), and Ian J. Barrow's *Making History, Drawing Territory: British Mapping in India, 1756–1905* (Oxford: Oxford University Press, 2004). For a sense of the mannerisms and Eurocentric attitudes of ethnographers at the local level, see any of the publications by Francis Hamilton Buchanan.

The issue of health and disease has produced some remarkable studies over the past few years. Among these are David Arnold's two books (1993, 1988), which are cited in the bibliography; a monograph by Mark Harrison, entitled *Climate and Constitutions: Health, Race, Environment and British Imperialism in India, 1600–1850* (New Delhi: Oxford University Press, 2003); and a collection of essays edited by Biswamoy Pati and Harrison, called *Health, Medicine and Empire: Perspectives on Colonial India* (New Delhi: Orient Longman, 2001). For a brief perspective on the education of the European civil servants during this period, see Cohn's "The Recruitment and Training of British Civil Servants in

India, 1600–1860" (1987a). Case Study B is based on the research carried out for Hill, *River of Sorrow* (1997).

CHAPTER 7

Once again there is an abundance of literature for most of the specific issues covered in this chapter. Unfortunately, the education of the colonial technocrats is not one of those areas. However, a couple of important monographs can help us understand the background of those whose views of nature's purpose profoundly affected South Asia. One is Adas's *Machines as the Measure of Men* (1989); another, which intriguingly uses the colonial discipline of anthropology as a lens to more clearly view imperial attitudes, is John Willinsky's *Learning to Divide the World: Education at Empire's End* (Minneapolis: University of Minnesota Press, 1998). Fortunately, research on colonial education is rapidly expanding, but for now, articles by Cohn (1987a), Hill (forthcoming), and David Gilmartin's "Imperial Rivers: Irrigation and British Visions of Empire," in *Decentering Empire: Britain, India and the Transcolonial World* (New Delhi: Orient Longman, 2006, 76–103), edited by Durba Ghosh and Dane Kennedy, provide an introduction specific to Indian administrators. For an interesting analysis of the education of engineers in India, see Arun Kumar's essay, "Colonial Requirements and Engineering Education: The Public Works Department," in *Technology and the Raj*, which we recommended earlier.

Ian Kerr's writings on the railway system in colonial India are an excellent place to begin any study of the train's impact on the environment; in addition to his *Building the Railways of the Raj* (1995), his edited volume *Railways in Modern India* (Delhi: Oxford University Press, 2001), contains a series of important essays, ranging from Marx and Gandhi's views on the effect of the system to Kerr's updated analysis. Daniel Thorner's classic work, *Investment in Empire: British Railway and Steam Shipping Enterprise in India, 1825–1849* (Philadelphia: University of Pennsylvania Press, 1950), provides an economic overview of the rapid expansion of the railway. Finally, for a nicely written survey of colonial railway history, see John M. Hurd's "Railways," in *The Cambridge Economic History of India*, Vol. 2: c. 1757–c. 1970 (Delhi: Orient Longman, 1982, 737–761), edited by Dharma Kumar.

Deforestation and the rise of scientific forestry has been the subject of so many global studies that the field has its own organization, the Forest History Society (FHS), which has developed an extensive environmental history database. The FHS Web site, www.foresthistory.org, is a wonderful resource. Turning to South Asia, the following titles can provide the interested reader with a taste of

the impact of scientific forestry on the South Asian environment and people. Gadgil's and Guha's *This Fissured Land* (1992) is a good place to start; their review and evaluation of the roots of deforestation and peasant responses to change is of great value. Mahesh Rangarajan's *Fencing the Forest* (1996) looks at the impact of government privatization of the forests in the Central Provinces, while K. Sivaramakrishnan's *Modern Forests: Statemaking and Environmental Change in Colonial Eastern India* (Stanford: Stanford University Press, 2000) studies the changes in forest policies in Bengal and the subsequent effect on the ecology of the region. Ravi Rajan, on the other hand, in his *Modernizing Nature: Forestry and Imperial Eco-Development 1800–1950* (Oxford: Oxford University Press, 2006), argues that serious state forestry, involving agriculturalists, silviculturalists, and other scientists, did not appear until after the resource crisis of World War I. Gregory Barton, in turn, in *Empire Forestry and the Origins of Environmentalism*, offers a more sympathetic view of colonial forestry than do many of the others. Finally, the essays on forestry in Arnold and Guha's *Nature, Culture, Imperialism* detail specific examples of the impact on the peasantry of colonial forest policy; of particular note are Jacques Pouchepadass's essay (1995) on swidden agriculture (noted in the bibliography) and Atlury Murali's "Whose Trees? Forest Practices and Local Communities in Andhra, 1600–1922."

One of the earliest studies of the effect of irrigation on the peasantry is Elizabeth Whitcombe's *Agrarian Conditions in Northern India*, Vol. 1: *The United Provinces Under British Rule, 1860–1900* (Berkeley: University of California Press, 1970). Whitcombe's study focuses on the impact of public works along the doab, with the first great expansion of canals after 1857, and concentrates on the impact on health, the soil, and productivity. Her book still stands as an exemplary study of the tangential effects of the concept of progress. In *Canal Irrigation in British India* (1984), Ian Stone focuses on the same region as Whitcombe, but provides a greater emphasis on the organization and technology of the canal system and its engineers. All of David Gilmartin's essays on irrigation are valuable; although he has too many publications to mention most of them, "Water and Waste: Nature, Productivity and Colonialism in the Indus Basin (*Economic and Political Weekly* 38 (48): 5057–5065), along with the article noted previously and the one in the bibliography, are good places to start. Rohan D'Souza's *Drowned and Dammed: Colonial Capitalism and Flood Control in Eastern India* (2006a) is invaluable, as are his various essays leading up to the publication of the monograph in 2006. His research concerning the role of capitalism and privatization in irrigation and its subsequent effect on the peasantry is groundbreaking. For other issues concerning water control and environmental change, especially in terms of colonial versus local knowledge, see Hill, *River of Sorrow* (1997); Benjamin Weil, "The Rivers Come: Colonial Flood Control and

Knowledge Systems in the Indus Basin, 1840s–1930s” (2006); and Gilmartin’s work.

The literature on health and diseases is much the same for post-1857 as it was for the pre-Rebellion period. Additions to the earlier notations include Ira Klein’s “Death in India” (1973) and Mark Harrison’s *Public Health in British India: Anglo-Indian Preventive Medicine, 1859–1914* (Cambridge: Cambridge University Press, 1994).

Finally, there are a few important studies of note on famine. Arnold’s work was emphasized in the last chapter; other works include Michelle McAlpin’s *Subject to Famine* (1983) and Hari Shankar Srivastava’s *The History of Indian Famines, 1858–1918* (1968). Regional studies include Laxman Satya’s *Cotton and Famine in Berar* (Delhi: Manohar Publishers, 1997), Hill’s essay on Bihar (1991) and Arnold’s article on Madras (1984), both noted in the bibliography. *Poverty and Famine*, Amartya Sen’s short study on the Bengal Famine of 1943, which argues from an economic perspective (1981), is deservedly considered a classic. Finally, an intriguing new collection edited by Brahma Nand, entitled *Famines in Colonial India: Some Unofficial Historical Narratives* (New Delhi: Kanishka Publications, 2007), offers some insightful views from contemporary civilians who were not forced to parrot the official explanations for various famines.

CHAPTER 8

In terms of the environmental history of Sri Lanka, the literature is once again sparse. With one exception, knowledge of the colonial and postcolonial period needs to be gleaned from surveys and textbooks. That major exception, however, is one of the true jewels of South Asian history in this decade, for James Webb’s *Tropical Pioneers* (2002) is an exemplary study of the environmental changes brought about by the plantation economy established on the island beginning in the 16th century. Emphasizing the plantation system in the 19th century, Webb connects the historic changes to the land and culture to the civil war continuing in Sri Lanka now. It is arguably the best study of modern Sri Lanka available. The other source, textbooks, should include those by De Silva (1981), Peebles (2006), and Bandarage (1983). Of these, De Silva’s *A History of Sri Lanka* provides the deepest explication of the island’s agrarian policy and hierarchy, while Bandarage’s *Colonialism in Sri Lanka* analyzes the changes in the highlands. One final newer study, which focuses on the perils of development within a historical context, is John Richardson’s *Paradise Poisoned: Learning About Conflict, Terrorism and Development from Sri Lanka’s Civil Wars* (Colombo: International Centre for Ethnic Studies, 2005).

There are a few more environmental histories of Nepal, although most deal with the period since the 1950s, when Mount Everest was opened for climbers. Stevens's *Claiming the High Ground* (1993) is one of the few detailed studies that looks at the impact of changes in agriculture and subsistence brought about by changes in social and agrarian policy, as well as the enormous increase in the number of tourists visiting the Himalayas in Nepal. Three recent studies of the Terai, all of them very helpful, are not published, but can be found on the Internet. Deb Ranja Sinha's "An Environmental History of the Nepal Terai," along with his Master's thesis on the same subject, can be found at www.singho.net, while Poshendra Satyal Pravat's "A History of Forest Politics in the Terai" is located at www.keene.ac.uk; on the home page, search for "Pravat."

There is a great deal of contemporary work on big dams in Nepal, much of it coming from the Internet or newspapers; Web sites include www.irn.org and www.dams.org. World Bank documents also provide an insight into the controversy over big dams in Nepal and elsewhere; they are available at www.worldbank.org. Finally, the superb study by Patrick McCully, entitled *Silenced Rivers: The Ecology and Politics of Large Dams* (1996), provides backgrounds for big dams not only in Nepal but throughout South Asia.

CHAPTER 9

The best survey of this period is Sumit Sarkar's *Modern India: 1885–1947*. When it appeared in 1983, it was the only social history of the entire independence movement. It still provides the best general explanations of how British agrarian, revenue, and political policy affected the peasants and their surroundings. Although it may prove a bit difficult for a novice, because it assumes knowledge of certain South Asian terms, any decent glossary in another survey should provide the needed translations. After finishing Sarkar, read Ranajit Guha's *Elementary Aspects of Peasant Insurgency in Colonial Bengal* (1983). Although not an environmental history per se, it was the first Subaltern Studies monograph, and it helped change the way environmental historians look at and for evidence of historical change (including environmental factors).

Although there are many studies of Gandhi and the environmental movement, the best historical overview is Ramachandra Guha's essay "Mahatma Gandhi and the Environmental Movement," found in Guha and Martinez-Alier's *Varieties of Environmentalism* (1998). The two essays by Vinay Lal and Larry D. Shinn, found in *Hinduism and Ecology* (noted earlier) also provide helpful interpretations. The best source, however, is Gandhi himself. His *Hind Swaraj* and

Autobiography are frank and direct, and they speak to his concerns with an enviable clarity and honesty.

The subject of partition has seen a trove of recent monographs, but few on the environmental history of the trifurcation of the subcontinent. Tan and Kudaisya's *The Aftermath of Partition in South Asia* (2000) provides three excellent chapters dealing with the environmental consequences; the first chapter provides an overview, and later sections look at the Punjab and East Bengal specifically. Reviews of Vazira Fazila-Yacoobali Zamindar's *The Long Partition and the Making of Modern South Asia* (New York: Columbia University Press 2007), released in late 2007, suggest that it may deal with some of the challenges facing the population because of environmental change. The World Bank's Web site has documents relating to the Indus Water Treaty. Finally, A. Nishat's essay "Impact of the Ganges Water Dispute on Bangladesh" (1996) carves a direct path from the division of the river and its tributaries in 1947 to the partition's continued environmental and social impact in contemporary Bangladesh.

CHAPTER 10, CASE STUDY C, AND THE CONCLUSION

The closer we get to the present, the more difficult it is to find historical perspectives on recent events. This does not mean, however, that we lack valuable studies on the issues covered in this chapter. Indeed, Ramachandra Guha's just-released magnum opus, *India After Gandhi: The History of the World's Largest Democracy* (Delhi: Picador, 2007), offers a massive, 900-page account of independent India from the perspectives of one of the founders of the field of South Asian environmental history. As to specifics, the sections in this volume on Nehru, commodification, big dams, industry, and environmental movements are all researched in some of the monographs noted here.

It is difficult, however, to separate Nehru's vision from the subsequent economic policy that emphasized industry, so this larger issue will be dealt with as one. The background on Nehru's early economic policy (and thus environmental policy in general) is ably described by Michael Brecher in *Nehru: A Political Biography* (1959). Although the work is dated, Brecher had the advantage of interviewing Nehru personally several times in the mid-1950s. However, perhaps the most succinct and clearest expressions of Nehru's impact on the environment can be found in two books released in the past two years: Rohan D'Souza's *Drowned and Dammed* (2006a) and, especially, Daniel Klingensmith's *One Valley and a Thousand: Dams, Nationalism, and Development* (2007). While D'Souza concludes by emphasizing the continuation of colonial policy into the early years of independence, Klingensmith begins with Nehru's early years; in

many ways these could be companion volumes, although they deal with separate river systems. Klingensmith describes the revolutionary Tennessee Valley Authority program in depression-era America, and then convincingly explains how its representation in India failed, in large part because of engineering arrogance and a sense of environmental universalism. These two volumes provide us with a history of public works since 1860 that cannot currently be matched.

Two volumes that deal with contemporary water problems at the state or local level are most useful in seeing how the historical issues affect the population in the 21st century. The first, a monograph by Lyla Mehta, entitled *The Politics and Poetics of Water: Naturalising Scarcity in Western India* (Hyderabad: Orient Longman, 2005), looks at current official responses and definitions of water and scarcity and compares them to the local population's perceptions, which are, of course, based on local knowledge. The second volume is a collection edited by Amita Baviskar, entitled *Waterscapes: The Cultural Politics of a Natural Resource* (Delhi: Permanent Black, 2007). The essays by Attwood, Hardiman, and Mosse are particularly useful.

Any bibliography on grassroots environmental movements in India must begin with Ramachandra Guha's *The Unquiet Woods* (1989). Perhaps the first explicit environmental history of India, Guha's work traces the roots of the Chipko movement to the development of scientific forestry in the 1860s. Guha provides one of the clearest examples available that 19th-century colonial environmental policies affect the contemporary peasantry in South Asia. Ashok Swain's "Democratic Consolidation? Environmental Movements in India" (1997) is a crisp digest of other environmental movements. Finally, Vandana Shiva's *Ecology and the Politics of Survival: Conflicts Over Natural Resources in India*, which can be found in its entirety at www.unu.edu/unupress, looks at grassroots movements involving forests, wastelands, water, and mining.

In terms of disasters, the natural ones dealt with in this volume are so recent that most of the evidence comes from newspapers and Web sites. Of the latter, www.un.org, www.reliefnet.org, and www.worldbank.org may be of most use, if simply in terms of gathering statistics and relief figures for the tragedies. The chemical disaster in Bhopal, however, has been the subject of quite a few studies. Certainly the most popular would be Dominique LaPierre's and Javier Moro's *Five Past Midnight in Bhopal: The Epic Story of the World's Deadliest Industrial Disaster* (New York: Scribner, 1999). Like all of LaPierre's work on India, this book is popular history and should be read for a general sense of the tragedy rather than as a professional study. Ravi Rajan, on the other hand, has carried out extensive historical research on the event. Among his series of articles, "Bhopal: Vulnerability, Routinization, and the Chronic Disaster," found in *The Angry Earth: Disaster in Anthropological Perspective* (London: Routledge, 1999),

edited by Anthony Oliver-Smith and Susanna M. Hoffman, is perhaps the best known. For a list of his other publications on Bhopal, go to his Web site (<http://people.ucsc.edu/srrajan>).

Case Study C, detailing the Narmada Bachao Andolan, depended enormously on Amita Baviskar's *In the Belly of the River* (2004). Although a sociological study, the historical background is superb, and her interviews are moving and insightful. An equally moving, if polemical, personal saga can be found in Arundhati Roy's essay "The Greater Common Good," found in her collection *The Algebra of Infinite Justice* (2002). Thayer Scudder, on the other hand, provides a professional analysis. Scudder was the principal World Bank resettlement officer for the Sardar Sarovar Project in the 1980s, and, upon visiting the site on numerous occasions, he became an early cautionary voice, warning of the ecological and social problems entailed in the resettlement. His experiences and findings are detailed in his unpublished essay, "India's Sardar Sarovar Project (SSP)," which can be found on his Web site at www.hss.caltech.edu. To keep current with developments concerning the Narmada Valley Project, go to www.narmada.org for the Web site of those who oppose the project and www.supportnarmadamadam.org for those who support it.

Finally, in terms of my critique of Indian history surveys in the conclusion, I would like to reiterate that there are now texts and authors who are exploring new ways to view the history of South Asia that depart from the standard political model. I have mentioned Ludden's and Robb's recent works and expect to see more. I would still urge those authors-to-come to consider environmental history as the loom upon which we can weave the warp and weft of the many individual regional and national histories of India, Pakistan, Bangladesh, Nepal, and Sri Lanka into the whole cloth that is South Asia.

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GLOSSARY

achut Untouchable.

adivasi Indigene; tribal, member of a tribal community.

ahimsa Total nonviolence in Jainism.

alim "A learned one"; singular of ulema.

alluvion Sand and silt thrown onto the banks by rapidly raging rivers.

anicut A type of dam.

Aryan Common usage for the group of people and their languages, who migrated from the Russian steppe east into India and west into northern Europe.

ashram A religious commune.

ashvamedha The horse sacrifice that symbolizes a king's authority and power.

atman The eternal soul, in Hinduism.

avatar An incarnation of the Hindu god Vishnu, who comes to earth during times of crisis. These include the gods Krishna and Ram.

babu Clerk; derogatory colonial term for an educated South Asian.

bankatai Forest lands in East Bengal.

benami "Without name"; refers to the practice of giving away cultivated land to relatives and invented persons to circumvent the land-ceiling regulations enacted after independence.

bhakti Devotionalism; a one-on-one relation with God in Hinduism.

bigha A land measurement roughly equivalent to 75 percent of an acre.

birawari The last of the early *diara* tenures; all land, including fallow fields, was charged a specific rent.

birta Land grants allotted by the king of Nepal to nobility and prominent families.

bodhi Enlightenment.

brahmadeya Villages gifted to local priests.

brahman Priest; member of the highest varna in Hinduism.

buddha One who has become enlightened.

bund Close; an embankment; a protest involving the closing of businesses.

chamar A dalit subcaste that traditionally works with leather.

- char** Highly unstable islands, usually found in deltas or some large rivers. Chars are composed of alluvial soil deposited by rapidly flowing rivers. They have no grounding on the river bed.
- chena** A form of slash-and-burn agriculture practiced in Sri Lanka.
- cyclone** A term for hurricanes that originate over water.
- dacoit** Armed robber; thief.
- dacoiti** The act of a group of people committing an armed robbery.
- dalit** "Untouchable"; one who is outside the caste system in Hinduism.
- dar-al-hab** Literally, "house of war." Commonly used to describe a region where Islamic forces were in danger of being defeated by non-Islamic forces.
- dasa** Slave; those people subjugated by the Aryan migration in North India.
- devi** Goddess.
- dhamma** Righteousness, as defined by Buddhism during the reign of Ashoka.
- dharma** One's duties or obligations to the sacred law; in Hinduism dharma is tied to the caste system.
- dharna** A tactic of satyagraha, in which one conducts a fast at the very doorstep of the person or people with whom the satyagrahi is conflicting.
- dhimmi** "People of the books"; Christians and Jews who are protected under Islam provided they pay the jizya.
- dhobi** A dalit subcaste whose members traditionally wash dirty laundry.
- dhoti** Sarong-like tube of cloth worn by men in India.
- diara** Fluctuating river tract composed of alluvial and diluvial soil.
- diluvion** Once-productive soil that becomes submerged as rivers change their courses.
- doab** "Two Waters"; the area incorporating the Ganges and Yamuna rivers.
- dom** Dalit group that fulfilled some of the most polluting tasks in Hinduism. Doms were used as midwives and funeral assistants under colonial rule.
- Dravidian** The language grouping of most South Indian languages, including Tamil, Telegu, and Kannada. Colonial ethnographers also used Dravidian as a racial classification, but this usage has been largely discredited.
- factory** A fortress or fortified village where factors, or East India Company merchants, lived and stored the goods they had purchased.
- five Ks** The five physical symbols of male Sikhism: a comb, bracelet, dagger, special undergarment, and uncut hair.
- ghat** Site for a funeral pyre; steps leading down to a river.
- guru** Teacher, mentor.
- guthi** Land grants allotted by the king of Nepal to religious and charitable institutions.
- hadith** Lessons based on the life of the Prophet that form part of Islamic religious law.

haj Pilgrimage to Mecca; one of the Five Pillars of Islam.

halhasila Peasant land tenure that followed *jotjama*; revenue charges were based on specific crops grown in a vaguely defined area.

jagir A revenue estate whose revenue is given as payment to a mansabdar for his service.

jagirdar One entitled to a jagir.

jajmani A system of occupational reciprocity that was historically practiced in village India.

jal samarpan Sacrifice by drowning.

jati One of the thousands of subcastes within the four varnas of Hinduism.

jhuggi A slum or shanty.

jihad In simplistic terms, a holy war in Islam.

jiva Roughly, "soul"; in Jainism anything with a life essence has a jiva, whose power and sophistication is derived from the number of the five senses possessed by the object. Integral to the development of ahimsa, or total nonviolence.

jizya Head tax paid by Christians, Jews, and, later, Hindus; in return they are protected and not forced to convert.

jotjama Peasant land tenure designed to encourage settlement on diara land. Revenue was based only on the amount of crops the peasants decided to grow in a given area.

kali yog Literally, "black era"; in Hinduism, the term refers to a period of evil on earth that will be reformed by the coming of the gods. Many believe the world is currently in kali yog.

karambu An oblique dam.

karma The accumulation of the results of one's performances of the sacred law; in Hinduism this is tied intrinsically to the caste system.

khadi Rough, homespun cloth. The wearing of khadi clothing became a symbol of the independence movement.

khalif Symbolic leader of the Islamic world; the position was abolished after World War I.

khalifate The office of the position of khalif.

khalsa A Sikh brotherhood.

kipat Land grant allotted to various ethnic communities by the kin of Nepal.

kirpan Sikh dagger; one of the Five Ks.

Koran Compilation of God's revelations to the Prophet Muhammad.

kshatriya Warrior or king; member of the second-highest varna in Hinduism.

lathi A weapon composed of a pole with a ball of lead attached to the top.

lathial One who yields a lathi.

lingam A phallic icon that is the symbol of fertility and the Hindu god Shiva.

lungi A tube of cloth worn like a sarong by South Asian men.

madad-i-ma'ash Under Islamic rule, the term meant aid for subsistence.

maharajdiraja King of kings.

mamluk A slave soldier, primarily found in West and Central Asia. Mamluks, although property, could rise through the military ranks, even becoming high-ranking officers. The early period of the Delhi Sultanate has been referred to as the "slave dynasty," because mamluk generals led the victorious armies.

mansab A ranking within Akbar's revenue system.

mansabdar An individual with a ranking within Akbar's revenue system.

mantra A word or term that, when repeated, will free the mind from illusion and help one gain a closer relationship with and understanding of true consciousness.

maya Illusion.

mela A religious festival; a fair.

mofussil Rural countryside; towns and villages away from the large urban centers.

moksha Extinction of the cycle of transmigration.

monoculture The process of growing a single crop. It can, at times, have disastrous consequences, as it did with potato growers in Ireland in the 1840s.

monsoon The rainy season in India, roughly lasting from June to August.

mouza Revenue and administrative term for a village.

nawab A prince or chief.

nirvana Extinction from the wheel of reincarnation in Buddhism.

nizam: A local or regional prince or chief.

pargana Revenue and administrative term for a cluster of villages or an estate.

patana Vast grassland of Sri Lanka.

patta A contract.

pattadar Headman of a Santal community.

periyanaadu Self-administered peasant villages.

pir Head of a Sufi sect; a Sufi saint.

pye-dog A mongrel.

raikar Rental agreement between the king and the Nepali peasantry.

raiyyat A peasant cultivator.

raj Rule, kingdom.

raja Ruler, king.

rajakariya Corvee or other form of labor tax owed to the king of Kandy in Sri Lanka.

Ramazan The month of fasting in Islamic South Asia; called Ramadan in other Islamic countries.

sadhu Hindu aesthetic.

sari An Indian woman's garment; a piece of cloth, varying in length from about 6 to 10 feet, that is wrapped around the body and worn with a blouse and petticoat.

sarkar Revenue and administrative term for a district.

sarvodya Literally, "the welfare of all." Gandhi's economic ideal that became an important aspect of satyagraha. Gandhi urged a return to traditional village life, roughly based on the *jajmani* system.

sati Immolation of widows; the act of a widow throwing herself on her husband's funeral pyre.

satyagraha Literally, "truth-force." Gandhi's vision for a just and peaceful India; satyagraha was not simply a strategy for independence. Satyagraha involved fasting, chastity, and active nonviolent civil disobedience, but internal discipline was an expected quality, as well as sarvodya.

satyagrahi One who practices satyagraha.

sepoy A regular Indian soldier, first in the employ of the various East India Companies, and then in the British Army.

shahada "There is no God but God and Muhammad is his prophet"; the central theme of Islam, which is said at prayers five times daily.

shakti The universal energy and power of the female.

Sharia Islamic law, based on the Koran and the hadith.

sheikh Leader of a religious community, especially a Sikh khalsa; a wise or revered older man.

Shia "Follower of Ali"; the second major branch of Islam whose followers believe the leaders of the community should be descendants of the Prophet Muhammad.

shirk Denial of the oneness of God; the absolute sin in Islam.

shudra Worker; member of the lowest varna in Hinduism.

silsillah Sufi association.

silviculture The science of forest control.

stupa A Buddhist commemorative structure.

subah Revenue and administrative term for a province.

Sufi A sect of mystical and charismatic Islam.

Sunni "Followers of the custom"; the largest and most traditional branch of Islam.

suwar A mansabdar's payment for the upkeep of his horses, men, and equipment.

tank A water reservoir, ranging in size from a rooftop water collector to those formed by large dams.

Terai A large swath of fertile land along the India-Nepal border.

thug A thief and killer who supposedly murdered his victims as a ritual offering to Kali.

thuggi The act of ritual murder in the name of the goddess Kali.

tirthankara A "ford crosser"; one who has crossed over to the next world, in Jainism.

tsunami Large waves formed by underwater earthquakes.

ulema "Learned men"; the closest approximation to a clergy in Islam.

vaishya Artisan; member of the third highest varna in Hinduism.

varna Literally, "color"; pertaining to the four major caste groups in Hinduism.

vizier Adviser; chief minister.

weir A small dam, often used to raise or lower flowing bodies of water.

yoga Rudimentarily, a discipline based on meditation, whose purpose is to lead to internal peace through becoming one with the eternal spirit.

yogi Religious teacher or mendicant.

yoni An icon representing the womb; a symbol of fertility.

zamin The Persian word for "land."

zamindar In Mughal India a local revenue collector; in British India a private landlord.

zat A mansabdar's personal salary, based on his status and rank.

INDEX

Note: italic page numbers indicate pictures.

- Abu Bakr, 52
- Aga Khan, 171
- Age of Consent Act of 1891, 112
- Agni, 21, 22
- Agra, 64
- Agrarian systems
 - and British East India Company, 93–97
 - commodification under British Empire, 123–124
 - and Hinduism, 42
 - medieval South India, 45–49, 59
 - Mughal mansabdari system, 67, 68–69, 75, 76, 211–221
 - post-independence India, 187
 - and private property, 93–94
 - Sri Lanka, 143–144
- Agra, and Taj Mahal, 71–72, 72
- Agriculture
 - and emotion, 59
 - and Indus civilization, 16
 - and rise of chieftainships, 15
 - See also* Agrarian systems
- Ahimsa, 28, 42, 165–167
- Aibek, Qutbuddin, 56
- Ajanta Caves, 18, 19, 35
- Akbar, 62, 66–67, 67
 - and Fatehpur-Sikri, 68, 69
 - impact on environment, 69
 - and mansabdari system, 67, 68–69, 75, 211–214
 - and religion, 68, 70
 - and Western Jamuna Canal, 64–65
- Alexander the Great, 10, 28–29
- Ali (son-in-law of Muhammad), 52
- Alptegin, 55
- Ambedkar, B. R., 171
- Amritsar Massacre, 165
- Ananta, 23
- Andhra Pradesh, 44
- Arjuna, 40–41
- Arun III Hydroelectric Project, 157
- Aryabhata, 35
- Aryans, 10
 - and agricultural surplus, 25
 - castes, 22, 23
 - and discrediting of invasion theory, 16, 21, 38
 - and irrigation, 25
 - as linguistic, not racial, group, 20, 21
 - migration, 20–21
 - society, 24–26
 - and Vedas, 20–21
- Ascetism
 - naked ascetic with tiger, 89
 - and Gandhi, 168

- Ashoka
 - despotism and subsequent conversion to Buddhism, 30
 - and *dhamma*, 29, 31
 - edicts of, 30–31
 - environmental concerns, 29, 31
 - and public works, 61
 - and vegetarianism, 31
- Attlee, Clement, 171–172
- Aurangabad, 74
- Aurangzeb, 72, 7
 - and Aurangabad, 74
 - and Deccan Wars, 73–74
- Ayodhya, 24
- Babur, 63–64, 66
- Badami, 45
- Bahadur, Tegh, 70
- Baluchistan
 - archaeological discoveries, 12, 12
 - precipitation, 5
- Banerjea, Surendranath, 113
- Bangladesh
 - and cyclones, 199–200
 - and Ganges riparian rights, 178–179
 - and Kaptai Dam, 193–194
 - and partition, 161, 174–175
 - precipitation, 5
 - and tsunami of 2004, 203
 - water problems since partition, 179–180
- Battle of Talikota, 51
- Bay of Bengal, 44
 - and cyclones, 199
- Bengal, 79
 - and British East India Company, 81–82
 - British view of, 91–92
 - famine of 1770, 99
 - partition of, 164, 178–179
 - and Permanent Settlement Act of 1793, 93–94, 127, 223–225
 - under Mughal rule, 214–217
- Bengal Tenancy Act of 1885, 94
- Bentham, Jeremy, 84
- Bentinck, William, 86, 87
- Bhagavad Gita, 40–41
- Bhakra Dam, 181, 183, 187–189, 188
- Bhakti yoga, 41
- Bhonsla, Shivaji. *See* Shivaji
- Bhopal chemical disaster, 195
- Birds, 8
- Bolan Pass, 9
- Bolan River, 12
- Bombay, 77, 86
 - plague (1896), 163
 - population growth under British Empire, 124
 - precipitation, 5
- Brahmana*, 21
- Brahmans, 22, 23
 - and medieval South Indian agrarian system, 45–46
- "The Bridge Builders," 92
- British East India Company, 10, 76–77
 - and agrarianism, 93–97
 - and Bengali clerks, 92
 - and civil service, 94–95, 105
 - and concept of difference, 88–91, 102
 - and disease, 102–105
 - district and junior officers, 106–107
 - and education, 85–86, 105–107
 - effects on environmental history, 83, 93
 - and evangelical utilitarianism, 85
 - and famine, 98–100
 - forts, 100
 - and free trade, 97–100
 - and French, 77, 79

- as heir to Mughal Empire, 82
- and interpretation of Indian history, 90–91
- intervention in religious and cultural practices, 86–87
- living arrangements for British citizens, 102–104
- and medical profession, 104–105
- and mercantilism, 77–81
- and precious metals, 77
- and prisons, 87–88
- and public works, 100–101
- relationship with India (allegorical painting), 98
- and scientific and technological validation, 91–92
- and sepoys, 87, 88
- and testing of ideologies, 83–84
- transition from business to governing body, 85
- and utilitarianism, 84–88
- See also* 1857 Rebellion
- British Empire, 10
 - and civil service, 113
 - and concept of difference, 111
 - concept of “martial” and “nonmartial races,” 112
- Dangerous Tribes Act of 1871, 127–128
- demand for and education of engineers, 116–121
- demand of cost of Rebellion from Indian government, 114
- and disease, 133–136
- “divide and rule” approach, 112, 164, 171
- and famines, 136–139
- focus on taking Indian wealth, 114–116
- and forest management, 125–128
- Public Works Department, 117, 128–131
- and racial separation, 112–114
- and railway construction, 121–123
- rewarding of those loyal during Rebellion, 111–112
- and social reform organizations, 112
- as successor to East India Company, 11
- technology and transformation of landscape, 116–117
- Village Notes, 127
- British India Association, 95
- Buchanan, Francis Hamilton, 95–96
- Buddha (Siddhartha Gautama), 25, 26
 - biographical sketch, 27
 - philosophy, 27–28
- Buddhism
 - and Ashoka, 30
 - and cave art, 35
 - and Delhi Sultanate, 56, 57
 - and Gandhi, 166
 - and Gangetic plain, 25–26
 - and human relationship with environment, 42
 - in Sri Lanka, 143, 147, 148
 - summary of philosophy, 27–28
- Bukka, 50
- Burke, Edmund, 84
- Burma, 163
- Calcutta, 77, 79, 86
 - Black Hole of, 80–81
 - and partition, 178
 - population growth under British Empire, 124
- Canals
 - and British Empire, 128–132
 - Ganges, 101, 175, 176

- Canals (*continued*)
 - Jamuna, 64–65, 101
 - Sarda, 131, 132
- Canning, Charles, 111
- Caste, 37
 - and British interventions, 87–88
 - and karma, 39
 - occupational theory, 38–39
 - race theory, 38
 - in Sri Lanka, 142–143
 - theory of divine origin, 37–38
- Caste Disabilities Removal Act of 1850, 87
- Cattle, drawing water, 48
- Cauvery River, 18, 44
 - allotment of waters, 205
 - and irrigation, 32–33, 33
- Ceylon. *See* Sri Lanka
- Chalukya dynasty, 44–45
- Chandragupta, 29
- Charter Act of 1813, 85, 97
- Chenab River, 175
- Chesney, George, 117–118, 119
- Chipko Movement, 172, 183, 197–198, 206
- Chisti, Salim, 68
- Chola dynasty, 44–45
 - and privatization of agricultural land, 46
- Cholera, 134, 135
- Churchill, Winston, 171
- Civil Disobedience Movement, 170–171
- Civil Lines, 112
- Civil service
 - British East India Company, 94–95, 105
 - and British Empire, 113
- Classical period
 - decline of, 42
 - religious and trade connections, 35–36
- Clive, Robert, 79, 81
- Cobras, 8
- Coffee, and Sri Lanka, 141–142, 144–150
- College of Fort William, 105
- Coopers Hill. *See* Royal Indian Engineering College
- Cornwallis, Charles, 83, 105
 - and Permanent Settlement Act, 93, 221–225
- Cotton
 - in Deccan, 18–19
 - transformation of industry in
 - British favor, 115–116
 - and U.S. Civil War, 122, 124
- Cotton, Arthur, 32–33, 129–130, 131, 132, 189, 191
 - and Grand Anicut, 205
 - statue of, 208
- Cows, 8
- Cultural zones, 9
- Culture and nature, 8, 19–20, 42
- Curzon, Lord, 164
- Cyclones, 199–200
- Dacoits, 107
- Damodar Valley Project, 189–191
- Dangerous Tribes Act of 1871, 127–128
- Darjeeling, 102–103
 - and “toy train,” 103, 103
- Daulatabad, 57–59
- Deccan
 - “cotton soil,” 18–19
 - early culture of, 18
 - plant life, 6
 - as route zone, 18
 - trade connections, 18

- Deccan Wars, 73–74, 75
 Deep Ecology Movement, 172
 Defence of India Act of 1915, 165
 Deforestation, 6
 and British East India Company, 77, 95–96, 100–101
 and cyclones, 199
 and historical continuity of South Asia, 207–208
 in medieval period, 52, 61
 and Mughals, 82, 221
 in Nepal, 152–155, 158, 160
 and railways, 101, 123, 124
 in Sri Lanka, 148–149, 150
 under British Empire, 114–115
 See also Chipko Movement; Forest management
 Delhi Sultanate, 56–59
 and non-Muslims, 56, 57
 Qutab Minar, 58
 and Vijayanagar, 51
 Delhi, 63–64
 Desai, Morarji, 248
 Dev, Arjun, 70
Dhamma, 29, 31
 Dharma, 37, 41
 Dhatusena, King, 34
 Difference, concept of, 88–91, 102, 111
 and health management, 133–134
 Dipendra, Prince of Nepal, 152
 Disease
 and British East India Company, 102–105
 and British Empire, 133–136
 Dorah Pass, 9
 Dow Chemical, 195, 196
 Dupleix, Joseph Francois, 79
 Dutch, 76
 Dyer, Reginald, 165
 Earthquakes, 200
 Bihar (1932), 168–169, 200
 Indus River Valley (c. 1700 BCE), 16–17
 Kashmir (2005), 200–201
 East India Companies, 71, 77
 and Black Hole of Calcutta, 80–81
 See also British East India Company; French East India Company
 East Indian Company College (Haileybury), 105–106
 closing of, 117
 East Indian Railway Company, 121
 Education
 and British East India Company, 85–86, 105–107
 English as language of, 86
 1857 Rebellion, 83, 90, 107–109
 and rifle cartridges, 107–108
 Elephants, 8, 107. *See also* Ganesh
 English language, 86
 Environmental history
 and Akbar, 69
 and Ashoka, 29, 31
 and British educational system, 105–107, 116–121
 and British Empire, 114–117, 140
 and British free trade policy, 97–100
 and British public works, 100–101, 128–132
 and British response to disease, 102–105, 133–136
 and dam projects, 187–195, 196–197
 and Gandhi, 165–172
 and historical continuity of South Asia, 206–209
 and Islam, 54–55

Environmental history (*continued*)

- and key religions, 42
- and medieval Southern peninsula, 51–52
- and medieval war and famine, 59–61
- and mountain tourism in Nepal, 158–160, 159
- and Mughal Empire, 82
- and partition, 174–181
- and peasant-nature reciprocity, 205–206, 208
- and post-Rebellion changes in British policy, 109
- and railways, 121–125
- See also* Agrarian systems; Deforestation; Disease; Gardens; Irrigation; Peasants

Fa Hsien, 35

Famine Commission, 121

Famines

- Bengal (1770), 99
- Bengal (1944), 100, 139
- and British Empire, 136–139
- 1860–1880, 121, 124
- 1895–1905, 163
- and market economics, 138–139
- and medieval environmental change, 59–61
- and Mughal Empire (1630–1632), 214
- Orissa (1865–1867), 125, 137–138
- South Asia (1335–1342), 49
- theories of causes, 137

Fatehpur-Sikri, 64, 68

Diwan-I-Khas, 68, 69 69

Jama Masjid, 68

Forest management

- and Coopers Hill school, 119

and fires, 126

and Indian Forest Act of 1865, 125–126

Narmada Valley, 235–236

and peasants, 125–128

See also Chipko Movement; Deforestation

Forests, 6

map of forested areas, 7

French East India Company, 79

Gandhi, Mohandas K., 163, 167

and Civil Disobedience Movement, 170–171

early life, 165–166

on epidemics and disasters, 168–169

on industrialization, 166, 168

on nonviolence, 169–170

opposition to exploitation, 166, 168

philosophical concepts, 166–169

and Salt March, 169, 170–171

and *sarvodaya*, 169

and satyagraha, 166, 169

in South Africa, 166

and village lifestyle, 169

Ganesh, 7, 37

Ganges Canal, 101, 175, 176

Ganges River, 1, 224 224

cultural and religious significance, 2

funeral ghats, 41

and partition, 178

Ganges-Jamuna doab plains, 17

Gardens, 65–66

Mughal, 64–65

Genghis Khan, 56

as ancestor of Babur, 63

and mass migrations into South Asia, 60

- Ghagra River, 24
 Ghazni kingdom, 55–56
 Ghuri, Muhammad, and kingdom, 56
 influence on Delhi Sultanate, 57
 Goa, 50–51
 Godavery River, 18, 44
 Gondwana, 1
 Grand Anicut, 32–33, 33, 205
 Grant, Charles, 85, 91
 Great Indian Peninsula Railway
 Company, 121
 Green Revolution, 184–185, 188–189,
 206
 Gupta, Chandra I, 35
 Gupta, Chandra II, 35, 42
 Gupta Empire, 35
 religious and trade connections,
 35–36
Guru Granth Sahib, 70
 Gyanendra, King of Nepal, 152
- Hanuman, 7
 Harappa, 15–16
 Hargobind, 70
 Harihara, 50
 Hastings, Warren, 90–91
 Hillary, Edmund, 158
 Himalaya Mountains, 1, 2
 plant life of region, 5
 rivers flowing from, 1–2
Hind Swaraj, 168
 Hindu Kush, 9
 Hindu Widow Remarriage Act of
 1856, 87
 Hinduism
 and agrarianism, 42
 and Delhi Sultanate, 56, 57
 and Gandhi, 165, 166–168
 and human relationship with
 environment, 42
 as monotheistic religion, 37
 spread to Southeast Asia, 35,
 36
 tenets, 37
 and Vedic religion, 23–24, 36–37
 and Vijayanagar, 50
 Hirakud Dam, 191–192
History of British India, 90–91
 Humayun, 66
 Huns, 42
 Hussain, Atiya and Irshaad, 54–55
- Ilbert Bill, 113–114
 India
 and Burma, 163
 and drain of wealth, 163, 164
 and Green Revolution, 184–185,
 188–189
 and industrialization, 183–184
 and modernization, 181
 and Nepali dams, 156–158
 and partition, 161, 172–176
 post-independence dam projects,
 184, 187–192, 194–195
 relationship between culture and
 nature, 8, 19–20, 42
 Indian Arms Act of 1878, 112–113
 Indian Councils Act of 1861, 111–112
 Indian Empire (map, 1947), 174
 Indian Forest Act of 1865, 125–126
 Indian Medical Service, 104,
 133
 Indian National Congress, 163
 Indian nationalist and independence
 movements
 emergence of, 163–164
 and Gandhi-Irwin Pact, 170–171
 and World War I, 164–165
 See also Gandhi, Mohandas K.;
 Nehru, Jawaharlal

- Indigo, 96
 - expansion of plantations and environmental effects, 114–115
 - harvest, 115
- Indo-European (Indo-Aryan) language, 20
- Indo-Gangetic Plain, 1–2
 - plant life, 5
- Indra, 21–22
- Indus civilization, 13
 - administrative and social organization, 17–18
 - and agriculture, 16
 - and crafts, 16
 - disappearance of, 16–17
 - duration of, 15
 - and seals, 16
 - and Vedic religion, 16
 - See also* Harappa; Mohenjodaro
- Indus River and Valley, 1
 - climate change, 17
 - earthquakes and flooding (c. 1700 BCE), 16–17
 - as economic nuclear zone, 9
 - and partition, 175–176
 - tributaries, 13
- Indus Waters Treaty, 176
- Influenza epidemic (1918–1919), 168
- Invaders
 - access routes, 9
 - difficulty in leaving, 10
 - mountains as barrier against Mongols, 1
 - See also* Aryans; British; Mughal Empire
- Iqbal, Muhammad, 171
- Irrigation
 - and Aryans, 25
 - and British East India Company, 101
 - and British Empire, 128–132
 - in early India, 32–34
 - in medieval South India, 45–46, 51–52
 - and medieval warfare, 61–62
 - in post-independence India, 187–192, 196–197
 - and transmission of disease, 136
- Islam, 52–53
 - environmental view of, 54–55
 - era of dominance, 55
 - establishment in India, 10, 55–56
 - imperial tripod, 62
 - and North India, 52
- Jafar, Mir, 81
- Jahan, Shah (né Khusrau), 70, 71, 73, 214, 217, 219
 - and decline of mansabdari system, 220
 - and Taj Mahal, 71–72, 72, 218–220
- Jahangir, 68, 70, 71, 214, 215
- Jainism, 26
 - and Gandhi, 165–168
 - and human relationship with environment, 42
 - tenets, 28
- James I, King of England, 76
- Jammu, 176
- Jamuna Canal, 64–65, 101
- Jatakas*, 25
- Jhansi, Rani of, 108–109
- Jhelum River, 175
- Jhuggis, 194–195, 196
- Jinna, Muhammad Ali, 164, 171
- Jiva, 28
- Jones, William, 90–91, 104
- Jute, 96

- Kafir, Malik, 57
 Kala River, 34
 Kalabagh Dam, 192–193
 Kali, 86
 Kalidas, 35
 Kalinga kingdom, 32
 Kandy kingdom, 14–142
 Kaptai Dam, 193–194
 Karachi, 124
 Karcher, Martin, 157
 Karikala, King of the Cholas, 32, 205
 Karma, 28, 35, 37
 and caste, 39
 Karma yoga, 41
 Karnataka, 45
 Kashi kingdom, 25
 Kashmir, 64, 65, 175, 176
 earthquake of 2005, 200–201
 Kasim, Mir, 81–82
 Kathmandu, 150–151, 155
 Kerala, 44, 45
 Khalji dynasty, 56, 57
 Khan, Ali Vardi, 79–80
 Khusrau. *See* Jahan, Shah
 Khyber Pass, 9, 10
 Kipling, Rudyard, 84, 92
 Koirala, B. P., 151
 Kosala kingdom, 25–26
 Kosi River, 2, 225–227
 and Permanent Settlement Act of
 1793, 227–234
 westward movement of, 226,
 227–229
 Krishna, 37, 40
 on karma yoga and bhakti yoga,
 41
 Krishna River, 18, 44, 45
 and Chalukya dynasty, 45
 and Vijayanagar, 51
 Kshatriya, 23
 Kurukshetra, 9
 battle of, 21, 24, 40
 Lahore, 63–64
 Lakshmi, 23
 Land management and tenure. *See*
 Agrarian systems
 Languages
 English as language of government
 and education, 86
 taught at East Indian Company
 College, 105–106
 Laws of Manu, 37
 Lilienthal, David, 175–176, 189
 Lingam, 16
 Lodis, 63–64
 Lothal, 16
 Lytton, Lord, 138
 Macaulay, Thomas Babington, 85–86
 Madras, 77, 79, 86
 population growth under British
 Empire, 124
 Madurai, 44, 45
 Magadha kingdom, 25–26
Mahabharata, 21, 24–25, 39, 40–41
 Mahanadi River, 191
 Maharaja of Darbhanga, 95
 Mahasena, King, 34
 Mahavira, Vardhamana, 26
 biographical sketch and teachings,
 28
 Mahaweli River, 34
 Mahmud, 55–56
 Malthus, Thomas, and Malthusian
 theory, 97, 98–99, 105
 Malwatu River, 34
 Mamluks, 55
 Maratha Confederacy, 74–75
 Marathas, 73–74

- Mauryan Empire, 26
 - and Ashoka, 29–31
 - and Chandragupta (founder), 28–29
 - and development of Buddhism and Jainism, 27–28
 - Kautilya, 29
 - religious and trade connections, 36
- Medieval period, 43
 - and environmental evolution of Southern peninsula, 51–52
 - and regionalism, 43
 - war, famine, and environmental change, 59–61
- Mehrgarh*, 12–13, 12
- Melas, 104
- Mercantilism, 77–79
- Mill, James, 90–91
- Missionaries, 85
- Mitra, 22
- Mohenjodaro, 15, 17
 - citadel, 15
 - and evidence of terminal disease in skeletons, 17
 - granaries, 16
 - grid, 15
- Mongols
 - and Delhi Sultanate, 56–57
 - invasions of 13th century, 1, 56
- Monkeys, 8. *See also* Hanuman
- Monsoons, 2–4
 - failures (1895–1905), 163
- Moral economy (patron-client relationship), 47–49
 - vs. political economy, 98
- Morse, Bradford, and Morse Report, 243–244
- Mughal Empire, 10, 61, 62, 63
 - and Akbar, 66–69, 67 67
 - and Aurangzeb, 72, 73
 - and Babur, 63–64, 66
 - and Dara Shukoh, 72–73
 - decline and demise of, 74–76, 111
 - and 1857 Rebellion, 109
 - and environment, 82
 - and eventual lack of arable land, 76
 - and Humayun, 66
 - and Jahangir, 68, 70, 71, 214, 215 215
 - mansabdari system, 67, 68–69, 75, 76, 211–221
 - remnants of, and British East India Company, 82
 - and Shah Jahan, 71–72
 - and Sikhism, 70
- Mughal Gardens, 64–65
 - at Kashmir, 64, 65
- Muhammad, 52
- Muhammad Shah, 75
- Mulk, ul-, Nizam, 75
- Munro, Thomas, 96
- Muslim League, 164, 171
- Muslims, and World War I, 164
- Nadir Shah, 71, 75
- Nana Sahib, 108–109
- Nanak, Guru, 70
- Nandi, 7
- Narayan, Prithvi, Shah of Nepal, 151, 152–153
- Narmada Bachao Andolan, 172, 239–248
- Narmada River and Valley, 234–239, 235
- Narmada Valley Project, 236–239
- Natural disasters
 - Gandhi on, 168–169
 - in independent South Asia, 198–203
- Nehru, Jawaharlal, 171, 172, 175, 186
 - and Bhakra Dam, 181, 183, 188

- on the environment, 208–209
- on Indian unity and diversity, 1
- mixed environmental and
 - economic concerns, 183
- and Non-Aligned Movement, 185–187
- Nepal
 - and dams, 156–158
 - and deforestation, 152–155, 158, 160
 - geography and environment, 141, 150–151
 - Hill Region, 150–151, 155–158
 - land grants, 153
 - Mountain Region, 150, 158–160
 - and mountain tourism, 158–159
 - political history, 151–152
 - precipitation, 5
 - Private Forests Nationalization Act of 1957, 154–155, 158
 - Terai (plains region), 151, 152–155, 154
- New Delhi, 164
- Norgay, Tenzing, 158
- Opium, 77, 79
 - factory, 80
- Orissa
 - and cyclone of 1999, 200
 - famine (1865–1867), 125, 137–138
 - and Hirakud Dam, 191–192
 - and Vijayanagar, 51
- Pakistan
 - Kalabagh Dam, 192–193
 - and modernization, 181
 - and Muslim League, 164, 172
 - and partition, 161, 172–176
 - precipitation, 5
- Pallava dynasty, 44–45
- Pandya dynasty, 44–45
- Partition, 161, 172–173
 - border delineation, 173–174
 - environmental effects of, 174–181
 - and Indus River System, 175–176
 - map, 177
- Patkar, Medha, 239–241, 240, 244–246
- Patna, 79
 - opium factory, 80
- Peacock Throne, 71
- Peacocks, 8
- Peasants
 - and British, 59
 - and British forest management, 125–128
 - and commodification, 123–124
 - and Damodar Valley Project, 190–191
 - and Islam, 59
 - and Kaptai Dam, 193–194
 - and land tenure, 45–47
 - and moral economy (patron-client relationship), 47–49
 - ploughing with oxen, 127
 - and raiyatwari system, 96–97
 - and Sikhism, 71
 - See also* 1857 Rebellion
- Permanent Settlement Act of 1793, 93, 127, 223–225
 - and Kosi River, 227–234
- Plague, 134, 135–136
 - Bombay (1896), 163
- Portuguese, 76
 - acquisition of Goa, 50–51
- Precious metals, 77
- Presidency Colleges, 86
- Princely State of Hyderabad, 75
- Public works
 - and Ashoka, 61
 - British, 100–101, 117, 128–132

- Public works (*continued*)
 and post-independence India, 184,
 187–192 , 194–195
 See also Mughal Gardens
- Punjab
 and Amritsar Massacre, 165
 archaeological discoveries, 11
 meaning of name, 13
 and partition, 175, 187
 and Sikhs, 69–70
- Purnia, 106
- Purusha, 21, 22, 37
- Qutab Minar, 58
- Radcliffe, Cyril, 173
- Railways
 and bridge construction, 122–123
 construction under British Empire,
 121–123
 and commodification, 123–124
 Darjeeling “toy train,” 103, 103
 and deforestation, 101, 123,
 124
 economic and environmental
 effects, 123–125
 Poona Mail, 122
 and population shifts, 124
- Raiyatwari system, 96–97
- Ram, 24–25, 37
- Ramayana*, 24–25, 39–40
- Ravi River, 175
- Reincarnation, 28, 37
- Religion. *See* Buddhism; Hinduism;
 Islam; Jainism; Missionaries;
 Utilitarianism; Vedic religion
- Rig-Veda, 21
- Roe, Thomas, 76
- Rowlatt Commission, 165
- Roy, Arundhati, 244, 245
- Royal Indian Engineering College
 (Coopers Hill), 118–119
 and grit, 119–121
- Rudra, 22
- Rushdie, Salman, 244
- Salt March, 169, 170–171
- Santals, 231–232
- Sarda Canal, 131, 132
- Sardar Sarovar Dam, 236–239, 237.
 See also Narmada Bachao
 Andolan
- Sarvodya*, 169
- Sati, 86–87
- Satyagraha, 166, 169, 171. *See also*
 Chipko Movement
- Schlich, William, 119
- Sepoys, 87, 88. *See also* 1857
 Rebellion
- Shah Jahanabad
 Diwan-I-Khas, 72
 Jama Masjid, 72
 Red Fort, 72, 218, 219
- Sharia, 53
- Sherpas, 158, 159
- Shiva, 16, 22, 37
- Shivaji, 73–74
- Shudras, 29
- Shukoh, Dara, 72–73
- Shunglu, V. K., and Shunglu
 Committee, 246
- Sikhism and Sikhs, 69–71, 171
 advancement after Rebellion, 111
 and Aurangzeb, 73
 and 1857 Rebellion, 109
 Khalsa (Brotherhood), 70
 surnames Singh and Kaur, 70
- Sind, 55
- Singh, Gobind, 70, 71
- Sinhalese, 142, 146, 147, 150

- Siraj-ud-daula, 80–81
- Sita, 24–25
- Sleeman, William, 87
- Smallpox, 134
- Smith, Adam, 97–98
- South Asia
- animal life, 6–8
 - climate, 4–5
 - commercial contacts with
 - Europeans (16th–18th centuries), 116
 - cultural geography, 8–11
 - drought and famine of 1335–1342, 49
 - five nations of, 161
 - Genghis Khan and mass migrations into, 60
 - geographical diversity, 1–4
 - as laboratory for testing European
 - political ideologies, 83–84
 - and modernization, 181
 - physiography of, 3
 - plant life, 5–6
 - precipitation, 5
 - prehistoric human activity, 11–13
 - rivers, 1–2, 4
 - seasons, 4–5
- South India
- adulation for Cotton, 132
 - ancient agriculture, 18–19
 - and irrigation, 32–33
 - kingdoms, 44–45, 46–47
 - medieval agrarian practices, 45–46
 - See also* Deccan; Southern peninsula
- Southern peninsula
- and cultural and trade connections, 9
 - early culture of, 18
 - geography of, 44
 - and monsoons, 2–3
 - southeastern deltas, 44
- Spices, 5–6, 10, 76, 78
- Sri Lanka, 3–4, 45, 141
- and caste, 142–143
 - and coffee, 141–142, 144–150
 - and Colombo-Kandy road, 146–147
 - and deforestation, 148–149, 150
 - and East India Company, 142, 143
 - geography and environment, 141, 142
 - Great Rebellion, 142
 - and irrigation, 33–34
 - labor system, 145, 147
 - Ordinances of 1840 and 1848, 147
 - physiography of, 33–34
 - plant life, 5
 - precipitation, 5
 - and rajakariya, 143
 - Rebellion of 1848, 147
 - and tea, 144, 149
 - and tsunami of 2004, 201–203, 202
 - village scene, 146
- Stephens, James Fitzjames, 90, 114
- Sufism, 53, 57, 68
- Sundarbans, 179, 180
- Suri, Sher Shah, 59, 61–62, 66
- Surya, 22
- Sutlej River, 175
- Swadeshi (home rule) Movement, 164
- Swidden, 126–128, 158, 193, 235
- Tagore, Rabindranath
- and family, 95
 - and Gandhi, 168–169, 200
- Taj Mahal, 71–72, 72, 218–220
- Tamil kingdoms, 32
- agrarian system, 46–49
- Tamil Nadu, 44, 45
- Tamil Tigers, 150, 201

- Tamil United Liberation Front (TULF), 150
- Tamils
 - and debt bondage, 145–146
 - in Sri Lanka, 142, 145, 150, 160
- Tamurlane, 63
- Tapti River, 18
- Taylor, Alex, 120
- Tea
 - expansion of plantations and environmental effects, 114–115
 - and Sri Lanka, 144, 149
 - Tamil Nadu plantation, 6
- Temple, Richard, 138–139, 230
- Tennessee Valley Authority (TVA), 175–176, 189
 - as model for Indian dam projects, 184, 187, 190, 191–192
- Thanjavur, 44
- Thar Desert, 11
- Thomason Civil Engineering College, 117
- Thuggi, 86–87
- Tigers, 7–8, 179, 200
 - destruction of Bengal habitat, 114
- Timur, 59
- Tobacco, 96
- Torrington, Lord, 147, 148
- Trade
 - British laissez-faire policy, 97–100
 - and Classical period, 35–36
 - and Deccan, 18
 - and Southern peninsula, 9
- Trevelyan, Charles, 99, 230
- Tsunami of 2004, 201–203
- Tufnell, Carleton, 120
- Tughluq, Muhammad, and sultanate, 49, 50, 56, 57–59
- ul-Mulk, Nizam. *See* Mulk, ul-, Nizam
- Union Carbide chemical disaster, 195
- Union Party, 95
- Upanishads, 23–24
- Utilitarianism, 84
 - Benthamite, 84
 - Burkean, 84
 - evangelical, 85–88
 - Platonic, 84–85
- Vaigai River, 44
- Vaishya, 22
- Varanasi, 2
- Vardhana, Harsha, 42
- Varuna, 21, 22
- Vedas, 20–21
- Vedic religion
 - Agni (fire god), 16
 - gods, 21–22
 - and Indus civilization, 16
 - sacrifices, 22–23
- Vegetarianism
 - and Ashoka, 31
 - and Buddhism, 42
 - and Jainism, 28
- Vidyaranya, 50
- Vijayanagar, 49–52, 50
- Vindhya Mountains, 2, 44
- Vishnu, 22, 23, 37
- Vishva-Bharati University, 95
- Vritra, 21–22
- The Wealth of Nations*, 97
- Western Ghats, 44
- White, Lynn, 54
- "The White Man's Burden," 84, 100, 114

- Wilberforce, William, 85
- Willcocks, William, 119
- Woods Despatch (1854), 86
- World Bank, 156–157, 175–176, 239
- World War I, 164–165
- Yoni, 16
- Zamindars, 94–95, 97, 232
 - and decline of mansabdari system, 220
 - disinterest in agriculture, 95
 - in post-independence India, 190
 - post-Rebellion rewards for loyalty, 111–112

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